The Chemical Age

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Refractories : A Romance of Industry

THE Jubilee Memorial Lecture of the Society of the Chemical Industry has generally been devoted hitherto to organic chemistry, and it must be confessed that papers on inorganic chemistry seem to be comparatively rare. It cannot be because organic chemical manufacturers are particularly more important or larger than inorganic manufacturers; in fact, the tonnage of substances manufactured by applications of inorganic chemistry is probably a good deal greater than that of organic chemicals. The root of the matter may be that major developments in inorganic chemistry seem to bring out something new with considerable regularity, particularly on the academic side.

The Society of the Chemical Industry has been fortunate in obtaining men of international reputation in refractories, such as Dr. J. W. Mellor and Mr. A. T. Green, to deliver the 1936-37 series of lectures. The reputation of Dr. Mellor as a writer of scientific works of considerable weight (literally and figuratively) is international, in addition to his eminence in the science of ceramics. The reputation of Mr. A. T. Green as a worker in refractories bids fair to equal that of his chief. The story of how research has enabled silica and fireclay material—particularly silica—quarried from the earth, to be converted into material that can be used for the exacting high-temperature industrial operations of to-day is one of the romances of industry. It is a story wholly of the 20th century. The quality of fire-resisting material prior to 1900 was low, and because of the limitations of these materials of construction, chemical and metallurgical processes could not be conducted under the most favourable conditions. The lecturers have pointed out that since increased temperature accelerates chemical reactions the tendency has been for furnace heats to be greater and even greater with increasingly insistent demands upon the quality of the refractory. The scientific study of refractories from the practical angle probably started with the coke oven industry in America, and it was because silica bricks were required of a high quality for the construction of coke oven walls that the study of the silica minerals was undertaken on an intensive scale, and that the knowledge that Dr. Mellor and Mr. Green are now able to impart was discovered in the curious metamorphosis of the allotropic forms of the silica minerals. No one who handles furnaces constructed of acid refractories can afford to be ignorant of these reactions and of the volume changes which accompany them.

The lecturers made the striking statement that 75 per cent. of failures of refractory materials are due to attack by slags, by slag-forming materials, or by gases. The chemical reactions that take place between the materials of refractories and the gases, solids and liquids contained in the furnace are remarkably complex. That certain types of firebricks can be completely disintegrated by the action of carbon monoxide has long been known. It has also been ascertained more recently that methane and other hydrocarbon gases have precisely the same effect, though the carbon monoxide reaction is effective at 500° C., while the methane reaction does not appear to have any serious effect until some 300° higher. Both gases are completely decomposed by certain iron spots exclusively composed of iron oxides, but not of silicates, whereby carbon is deposited, which by its accumulation and growth splits the brick in pieces. This is not unlike the parallel action whereby iron and iron oxide rapidly decompose ammonia at suitably elevated temperatures, but iron silicate and iron sulphide have little or no accelerating influence upon that reaction. The action of slag is more complicated because the composition of slag may in itself be far from simple. A few degrees extra furnace temperature will render a slag much more liquid and may thus enormously accelerate the attack on refractories. The porosity of the refractories will, of course, have a considerable influence. The relative chemical composition of the slag and refractory will also have an effect comparable with that of the absolute composition of the slag. It may be possible to use a basic slag with a basic refractory, but not an acid slag with a basic refractory or vice versa. Some slags "wet" the surface of the refractory, whilst others do not.

These few remarks in no way represent the substance of the Jubilee Memorial Lecture. They are given here to illustrate the principle that the importance and complexity of the problems of inorganic chemistry may be equally as interesting to the chemist as are those of the various combinations of carbon atoms which we know as organic chemistry. Without adequate refractories a great proportion of our chemical industry could not be carried on because the refractories are used directly for the production of chemicals or because they are required for the manufacture of the materials from which chemical plant is produced.

One final word. Last year we urged that in view of the large attendance, the Jubilee Memorial Lecture should be held in a more spacious room than that of the Chemical Society. Our advice was taken this year by the London Section and we congratulate the section upon the more comfortable conditions under which the 1936 London lecture was held.

Notes and Comments

Questionnaires

THE plant maker sends the plant user a questionnaire with his catalogues for a specific purpose. If the user is genuinely in need of new or additional plant, the maker wants the necessary information which will enable him to put forward a proposal and possibly, at the same time, a quotation for the plant which he can supply. But, genius though he is, he cannot do this without precise information as to what is required. The user passes this information on to him in a letter, maybe, and probably at an interview, but to simplify matters he often likes to have a summary in the form of question and answer. This little difference in point of attention on the user's part makes a great difference to him. He, as a maker of plant, knows too well that there are some seemingly trivial matters which have a direct bearing on design and consequently on cost of construction. It may be deemed inquisitive—from the user's point of view—but the " inquisitiveness " is for the customer's own benefit. A particular point which the purchaser has stressed is queried by the plant maker. He wants to know if it is essential, or is it merely a suggestion which has become mixed up with more concrete ideas. The plant maker is an engineer, but the purchaser will be the user of the plant. He knows, or believes he knows, of the difficulties which may arise when the process is in operation. The plant maker wants to hear about them in order that the user may be free of troubles. Therefore it is to his advantage that he fills in the questionnaire which the maker has sent—conscientiously, and with just that precise detail he anticipates. Other things of which the user alone is aware should be in the form of separate statements composed of plain words which even a lawyer could not fail to understand.

The Andersonian Chemical Society

THE Andersonian Chemical Society, which claims to be the oldest college students' chemical society in the British Empire, if not in the world, has just celebrated its jubilee. It was founded in November, 1886, when Professor Dittman was professor of chemistry at Anderson's College, Glasgow, which in 1912 became known by its present name, the Royal Technical College. As hon. president, Professor Dittmar delivered the first presidential address, on " The Atomic Theory," in January, 1887. Weekly meetings and a monthly journal were arranged at the outset, but in the third session the impetus was somewhat checked and fortnightly meetings were substituted, while the journal faded out at the end of 1890. The Society has had its ups and downs, but altogether the names of about 1,200 members, past and present, are on its books. In 1923 a state of coma overtook the society, resulting in a petition in the following terms: "The undersigned wish to call an extraordinary meeting of the Andersonian Chemical Society in order to consider the following state of affairs, *e.g.*, to wit, that is to say, that it has been rumoured that an outbreak of encephalitis lethargicus, commonly known as that tired feeling aggravated by the softening of the cerebral tissue, has affected the chemical department; and that under the circumstances the Society should take all necessary steps to protect its members from this insidious disease." The records show that at that time this disease was eradicated and the society appears to have flourished ever since.

Five-Year Plan for Chemists

DOES the chemical profession desire a complete unification of its three main chartered societies into one all-embracing organisation, with a possible membership of some 14,000 and an all-in subscription of, say, £5 per annum, or does it want merely a " greater measure of co-operation " among the existing bodies? With characteristic reserve, leaders of the profession have for long talked vaguely of the latter, and have welcomed, with various reservations, the establishment of the Chemical Council as a step towards that end. Sir Gilbert Morgan, however, has unequivocally declared himself in favour of the former, and, if we read aright the touching message from Professor Armstrong which he read at the annual chemical dinner last week, the doyen of the profession shares his views. The Chemical Society will be 100 years old in 1941, and Sir Gilbert suggests the immediate inauguration of a five-year plan to the end that the centenary celebrations may be marked by the consummation of unification. Such a plan is bound to be beset with difficulties, for each society is governed by its own charter and co-ordination of policy will call for strong leadership. The Chemical Council as at present constituted is not committed to anything so drastic, but there is no reason why it should not explore the possibilities of unification in consultation with its constituent bodies.

Position of the Other Societies

WHILST there is much to be said for Sir Gilbert Morgan's five-year plan, the position of a number of other societies which have the welfare of the chemical profession equally at heart must not be overlooked. On the one hand, the chemists cannot ignore the chemical manufacturers, to whom the Chemical Council has been appealing lately for financial support. On the other hand there are bodies like the British Association of Chemists, with a membership of nearly 2,000, concerned with the raising of the economic and professional status of all qualified chemists and the protection and promotion of the economic welfare of its members. The Chemical Council is empowered to co-opt representatives of " other bodies," but only with the separate and collective approval of the councils of the " big three "—an important proviso which might conceivably exclude any organisation suspected, rightly or wrongly, of rivalry or redundancy. Other societies, even if they had the opportunity of falling in with unification, might not desire to lose an individual identity which they have built up over a number of years, but there would be a danger that, remaining outside, they would lose something of their existing status through being eclipsed by a so-called all-embracing society. Whilst the members of the three chartered bodies should seriously consider Sir Gilbert's plan, it is equally important that the rest of the societies should ask themselves " How is this going to affect us, and what ought we to do about it?"

I would like you to convey my greetings but also to say good-bye for me—the frivolity of a public dinner cannot well be mine again.

My message to you comes from over seventy years. During that time we chemists have made our science the most wonderful of all sciences and know that we hold the key to life.

The progress made of late in deciphering the complex series of interactions involved in fermentation by yeast and in oxidation by muscle is more than wonderful—we should soon sufficiently understand the process of plant and animal nutrition to be able to guide both agriculture and animal nutrition.

I fear we are in no way alive to our importance; leadership seems to have left us. Only one course lies open to you—to come together as one man; to organise yourselves into a great scientific profession. At present you lack ideals; too much that is done is unworthy of you. Far wider and fuller understanding is required of you under the present serious condition of affairs in most other countries.

May you be wise in time. Farewell.—HENRY E. ARMSTRONG.

This message from Professor Armstrong was read by Sir Gilbert T. Morgan at the annual Chemical Dinner on November 19. The Professor's exhortation merits the earnest consideration of an even larger audience of British chemists than was present at the dinner.

Sir Gilbert T. Morgan, chief guest at the Annual Chemical Dinner.

The Annual Chemical Dinner

Sir Gilbert Morgan on the Prospects of Unification

CLOSE upon 250 members of many different spheres of the chemical industry and their friends attended the annual Chemical Dinner at the Wharncliffe Rooms, Great Central Hotel, London, on November 19. Mr. F. A. Greene was again responsible for the organisation of a very convivial evening, with the co-operation of members of the Chemical Society, Institute of Chemistry, Society of Chemical Industry, Society of Dyers and Colourists, Society of Public Analysts, Farday Society, Biochemical Society, Institution of Chemical Engineers, Institution of Petroleum Technologists, Oil and colour Chemists' Association, British Association of Chemists, Association of British Chemical Manufacturers and the Chemical Club.

Professor A. G. Green presided and the principal guest was Sir Gilbert T. Morgan, director of the Chemical Research Laboratory, Teddington. Amongst others present were Lady Morgan, Lord Leverhulme (president of the Society of Chemical Industry), Mr. J. F. Ronca (president of the Chemical Club), Mr. C. B. Woodley (general secretary of the British Association of Chemists), Mr. W. A. S. Calder, Dr. and Mrs. J. T. Dunn, Dr. and Mrs. P. C. C. Isherwood, Dr. and Mrs. L. H. Lampitt, Dr. and Mrs. H. Levinstein and Mr. and Mrs. J. Davidson Pratt. The message quoted above was received from Professor H. E. Armstrong. The speeches, as usual, were restricted both in number and length, and were confined to one toast, to allow ample time for dancing.

Sir GILBERT MORGAN proposed the toast of "Chemistry," and referred to the prospects of a greater measure of unification of the chemical profession. When he was president of the Society of Chemical Industry in 1932 he devoted his presidential address to "Ourselves and Kindred Societies," and pointed out that a considerable proportion of a chemist's subscription went in administrative and office expenses, while the essential task of supplying to British chemists a complete epitome of chemical progress in the form of transactions and abstracts was becoming an intolerable financial burden to the societies which undertook the major part of that vital function. The present multiplicity of chemical associations was wasteful in time, energy and money. In more recent years the problem had been explored, first by a committee of the Federal Council, under Sir William Pope, and then by a committee of exploration, under Mr. Davidson Pratt. The Chemical Council, of which Dr. R. H. Pickard was chairman, came into being last year, for a trial period of seven years, and had so far held eleven meetings. The aim of the Council was not to inaugurate a new association, but to promote co-operation between the three chartered chemical organisations, economies in administration and in publication, the furtherance of chemical science for the public good, more extended publication of new knowledge and abstracts, the maintenance of the chemical library and the raising of funds. Some £22,000 had already been promised and partly collected.

The whole of the objects of the Chemical Council could not be realised at once, and he appealed for patience on the part of those who were desirous of seeing unification. The co-ordination of the policies of the three chartered bodies, each of which was governed by its own charter, was a difficult matter, calling for able leadership. At present there was competition for new members among the various associations, but he visualised the time when they would have an all-embracing society with a membership of something of the order of 14,000. The advantages of such a united front would be immeasurable, and he believed their objects could be achieved with an all in subscription of £5 per annum.

In 1941 the Chemical Society, the oldest chemical organisation in the world, would celebrate its centenary, and he suggested that the chemical profession should launch a five-year plan, so that by the time the centenary was celebrated their dreams might be realised.

The CHAIRMAN, in responding to the toast, strongly supported Sir Gilbert's appeal to those present and to the whole chemical profession to give their utmost support and help, both financial and otherwise, to bring about the unification of the profession which they had so much at heart. For years past Sir Gilbert had done signal service in urging this matter on many and various occasions, and it was a subject which they could not fail to regard as one of extreme importance if the chemical profession was to take the position in the life of the nation to which its past achievements and the certainty of a great future for its activities entitled it.

There had been a feeling among many of them that the time was ripe for a more whole-heated step in federation than that which had actually been taken and a tendency to regard the formation of the Chemical Council as that of one more redundant society. They must, however, regard the movement as only a preliminary step in their progress to a more complete federation, when the chemical profession would be able to speak with one voice in public affairs, and when there would be a single membership subscription and a central home where a great chemical and technical library could be housed, and from which all chemical publications would issue.

Should Colour Fastness be Guaranteed?

Society of Dyers and Colourists' Symposium

A MEETING of the Manchester Section of the Society of Dyers and Colourists was held at the Constitutional Club, Manchester, on November 20. Mr. N. Chappell presided over an attendance of about 120 members. The meeting took the form of a symposium on the subject of "Should Fastness be Guaranteed?" and five papers were presented covering the points of view of the retailer, the dyer, the printer, the paper trade, and the dyestuff manufacturer.

Mr. J. GUILFOYLE WILLIAMS, of the merchandise research laboratory of Selfridge and Co., Ltd., London, dealt with the position from the point of view of the retailer. In general, he was of the opinion that the grading of fastness in the mind of the retailer and his customers took a course somewhat as follows. Loose colours were those which proved unsatisfactory in the ordinary treatments of normal use. Ordinary colours would not give any serious grounds for dissatisfaction after a reasonable period of use. Fast colours would prove satisfactory for a long time in ordinary use, or would withstand, without serious effects, somewhat severe treatments in use. Very fast colours remained satisfactory after very long use, and would successfully withstand severe normal treatments. With many people the term "fast" would be held to have the same meaning as he had given to "very fast."

When the term "guarantee" was used, it was presumed that the failure of the goods after a reasonable period of proper use would be met by some compensation. The important point, however, was that the customer believed that if a guarantee could be given the quality of the colour of the goods must be very satisfactory.

It might be thought that the retailer should make tests on the lines that he was selling in order to eliminate the very defective dyeings. A moment's reflection would show that this was usually impracticable on made-up goods.

A Helpful Suggestion

He wished to offer a suggestion which might be helpful. The minimum degree of fastness depended on the treatments that articles received in use. It was unfortunate that the public received no guidance from dyers on the suitable washing treatments for coloured goods. For instance, he frequently examined coloured goods of wool, or of silk, which had failed in washing, and found that a simple scouring treatment after washing and rinsing would restore the colour, or prevent the bleeding or migration of colour. While dyestuffs sensitive to the inevitable alkalinity of ordinary washing continued to be used it was surely common-sense to tell folk how to wash them to obtain results that would be satisfactory.

Mr. N. HAMER, speaking from the point of view of the dyer, said that the answer to the question, "Should Fastness be Guaranteed?" was a qualified "Yes." The guarantee set up a standard, and thereby gave incentive to the dyer and dye-maker. It safeguarded the ultimate purchaser, and by promoting goodwill and a sense of security tended to increase sales. Moreover, it would discourage the unscrupulous dyer. In his opinion, the actual form of guarantee would require to be very materially different from those generally operating at present.

If any departure was to be made from the present absolute guarantee, it was essential that guarantors should agree to the adoption of a uniform standard of fastness. The determination of such a standard should preferably be in the hands of a neutral body, and the work of the Society's fastness committee appeared to offer an eminently satisfactory basis for this purpose.

Mr. L. A. LANTZ expressed the point of view of the printer, as well as that of a representative of the light fastness committee of the Society of Dyers and Colourists. This committee had done a considerable amount of work in setting up standards and tests with regard to fastness to light, washing and perspiration of dyed and printed fabrics.

The reason for mentioning the fastness committee's work was that guaranteeing fastness implied measuring fastness, and the Society's standards and tests were, it was believed, and it was hoped the trade would agree, convenient ways and means for estimating the fastness of colours on dyed or printed goods. These standards were not commercial standards in the sense of directly defining certain commercial classes of coloured goods with regard to fastness. They were simply a measuring instrument, a kind of yardstick, by the use of which fastness was measured and expressed in figures.

It was obvious that a single fastness specification could not be formulated to cover both dyed and printed goods, nor even all classes of guaranteeable printed goods. Technical considerations made one think, as far as the printer was concerned, that the suggestion was somewhat premature.

The Fading of Papers

Mr. H. AINSWORTH HARRISON, dealing with the point of view of the paper trade, said that very few papers indeed showed no fading whatever when exposed to bright sunlight for a considerable period, even in the driest and purest atmosphere. For what length of time, then, should the guarantee hold good? One could assume a satisfactory answer to this question might be forthcoming, but the problem was not, of course, so simple as that. The effects of high relative humidity and of atmospheric impurities, particularly H_2S, and SO_2, were well known, but the customer was not in the least concerned with these conditions. To argue that a paper had not faded because of sunlight but because of SO_2 in the Manchester atmosphere did not impress him in the least. In his opinion, the time was not yet ripe in the paper trade, in the absence of more precise methods for indicating fastness degree, and of a close understanding by the manufacturer of the purpose his papers had to serve, for general guarantees to be given. Limited guarantees, however, implying that a paper was equally as good as the sample submitted, were at present accepted as an essential of business relationships.

Mr. H. JACKSON, speaking for the dyestuff manufacturer, wished to throw out a warning to those who were fostering the fetish for high degrees of fastness to make every effort to keep their desires within reasonable limits. Dyestuff manufacturers knew from experience the peculiarities and difficulties which could arise in saying that any piece of coloured material could be guaranteed when there was no control over the treatment to which the coloured goods were finally submitted.

Mr. Wells Will Never See it Through

A Revolution Called for in Education

By Professor H. E. ARMSTRONG

ROMES are not only burning: they are ruthlessly bombed into burning to-day. At the same time, the Atlantic is crossed in 12 hours by an intrepid aviator gifted with bird-like powers of finding his way. In all ordinary affairs men have lost their way, being steeped in ignorance. It is more than astonishing that we are most of us content to be ignorant about everything going on around us, if in the least a departure from ordinary human action.

That this must be so, the chemist alone knows—supported of course by the physiologist.

Man to-day is essentially made of the stuff of which he has been made throughout the ages. If he were open to any serious variation, he would not be man—he would be all sorts of curious creatures, if anything.

Most of us are made of the *Old Man Stuff*. The few alone carry *New Man Stuff* in their composition. Our actions are limited accordingly—not to be seriously modified by education.

Speech is man's pre-eminent gift. Man in the past has won his way as a talker. The talker has taken charge generally and the talkers have seen to it that their type shall be instructed in talking. People have come to believe in talkers. They take charge of us to-day. The schools are in their hands and they continue to teach talking—*never doing*, apart from handiwork.

Only within about two hundred years, has the authority of the talkers been challenegd by a new set of men who have developed a method of inquiry which enables them to penetrate behind the veil of mystery which had hitherto covered up the world. These are largely made of a special kind of stuff, which functions differently from talkers' stuff. The majority of us are made of *old-man stuff;* a minority of this *new man stuff* but this minority has now taken charge, except in education and politics.

Utopia is Impossible

I would deny at once the assumption made by H. G. Wells that all men can and will ultimately be able to think alike: that, in fact, a world Utopia is possible. Mr. Wells will never "see it through." Chemistry might as well be reduced to a single element; a single type of structure His doctrines are of no practical value. He is an ancient number, in fact.

Wells is made of old-man stuff: he has not the faintest understanding of scientific method. Years ago he scoffed at me when I became its advocate. Over a long period, in one character or another, he has advocated his views and has gained a certain amount of popularity, though he has achieved nothing, as—true to type—he has had no constructive influence. In his latest effort, *The Anatomy of Frustation*, he has surpassed himself in incoherence; those who have turned over his pages, must be so sick of the word, that they will all wish that it be expunged from the language. It is true he foresees the need of a new education with new teachers: yet his own contribution is to be a new *World Encyclopædia*, that is to say, he contemplates continued education by books. Taken separately, his ideas may be good: collectively, he has no contribution to make which will develop the new-man stuff that is in us to its full value.

I can appraise the position from a close study of the problems during seventy years. I know what is possible. I began when the South Kensington Science and Art Department was at its most active and influential period. Test-tubing by Government grant was in full swing—the system was purely mechanical and of little intellectual value to most. With very few exceptions, there was no science in the schools; we were promised the millennium from its introduction—by Herbert Spencer and Huxley, in particular.

Whatever its faults, the Science and Art Department did a great work, but it made one fundamental blunder. The system allowed men to teach without any proper disciplinary training—merely on going through a very elementary course of instruction. The superiority of Scottish education in the past was due to the fact that the village schoolmaster had enjoyed a full course at the University. In the South, in founding our Elementary system in 1870, we repeated the South Kensington blunder. The training course, favoured by the Board of Education, we know to be most unsatisfactory. Very few teachers who are not specialists are in the least degree competent for their work—even those from the University. Scarcely any are conscious of their mission—they can only teach as they have been taught.

Before I began the study of chemistry, I had been confronted with a mass of information about things but how that information had been gained I could not see. Results, always results; method never. I went through the Royal College first year without effort—the practical work was interesting and obvious: the one lesson in method I got—the need of making sure—was when I returned Cadmium for Arsenic. In the second year, I began to see what experimenting meant, in the course of the work I did with Frankland in developing the Vacuum Combustion Method of Water Analysis. Even this involved no argument. During my stay in Germany I gained full insight into the method first introduced by Liebig, which has made the German schools so famous. The fundamental tenet of the system was—*Trust the teacher!* a doctrine long since disallowed here. Themes were set for experimental study. It is noteworthy that the student was plunged straight into a problem, without previous systematic training: this came only when numbers grew and classes were organised in analysis—hence the test-tubing. Numbers always create a difficulty.

The Student's Self Esteem

The student regarded himself as a creative worker but he had no disciplinary training in the method of inquiry. He became an experimentalist for the time being—learnt to work practically, in fact. His self-esteem was raised. The teacher was left to say when his pupil could be regarded as a competent worker: only then was the degree given.

I gradually became conscious of a method in the background. An ardent experimentalist from the beginning, I sought to enlarge my knowledge of materials in every direction, without centring my attention upon any one subject in particular. I read hard as well.

On my return, after about two and a half years, I was fortunate in obtaining charge of the London Institution laboratory—without any special obligations. With the aid of a number of young friends, I did a vast amount of work there, during about ten years. In fact, I was the one active young worker of the time.

I also coached medical students at St. Bartholomew's Hospital and here began to put my teaching ideas into shape. I also wrote a systematic *Text-book of Organic Chemistry* (1874), which was followed by the article on *Inorganic Chemistry* in the *Encyclopædia Britannica*, and a rewritten edition of *Miller's Organic Chemistry* with C. E. Groves. I also did a good deal of examination work. Finally, from 1875 on, I was secretary of the Chemical Society. I was saturated with chemistry, in the end: fully alive also to the superficial character of the training in the schools.

When, in 1879, I was appointed, with my late colleague, W. E. Ayrton, to organise classes at Finsbury for the new City and Guilds Institute for the Advancement of Technical

Education, foundations were already fully laid in my mind for the preparation of a systematic course of problem studies, the chief object of which should be to give training in the art and method of discovery, as a means especially of teaching students to think, observe and act for themselves.

I developed the system of *Heuristic* training. This was brought under public notice in 1884, at the Education Conference held at the Health Exhibition. The story is fully told in my *Teaching of Scientific Method* (Macmillan).

I taught under my system during about 30 years at the Central Technical College. It was also applied in elementary schools by Messrs. Gordon and Heller; later on, over a long period in Irish schools of various grades, by Mr. Heller. From 1902 onwards, during many years, heuristic teaching was systematically given in Christ's Hospital, Horsham, by Mr. C. E. Browne, with conspicuous success. I was in constant contact with this work.

Wherever it was honestly tried by competent teachers, the method was a success. It broke down in practice because of the high demands it made upon the intelligence, thought and time of the teacher: it called for efforts the majority were unwilling, if not unable, to make .

If we are to maintain our civilisation, we must not only reintrodûce the method but make it general. It is Nature's method. The current method of lesson learning is popular, because it is easy and permits of dogmatic teaching but it is little short of worthless.

We have to dismiss the present race of teachers, who are made of Old Man Stuff, for men who can be practical. Schools must be largely converted into workshops, in which habits of discipline will be firmly established, as well as the scientific habit of mind—in so far as this may be possible. All will benefit, however, as they will have learnt by doing. I know that this can be done—because I have done it!

Nothing short of an absolute revolution will serve our purpose and give us an efficient nation. University education must be drastically changed in character. Public examinations must go.

I propose to consider "The Workshop School of the Future" in another article.

Corrosion in the Refrigerating Industry

A Symposium held by the British Association of Refrigeration

CORROSION at low temperatures differs from that at high temperatures in that the first is largely electrochemical and the second largely chemical, said Dr. U. R. Evans, of Cambridge University, in a contribution to a symposium on "Corrosion in the Refrigerating Industry," held by the British Association of Refrigeration at the Institute of Marine Engineers, E.C.3, on November 3. The direct combination of, say, iron with oxygen will soon lead to a scale of oxide, which will tend to shut off further oxygen from the metal; unless this oxide-scale cracks off as it is formed, any continuation of the attack must depend upon the power of oxygen or metal to diffuse through the scale. At high temperatures such diffusion is rapid, and oxidation will continue; at low temperatures it is extremely slow, and oxidation in dry air usually stifles itself before the oxide has even become visible. It is nevertheless true that, in the presence of water containing oxygen, some direct attack can occur, but here also the attack is limited by a relatively slow diffusion process and, generally speaking, does not lead to serious damage.

An Oxidation Process

If, however, iron is immersed in brine, and if, for any reason, an electric current flows between different parts of the surface, alkali and ferrous chloride are produced at the cathodic and anodic places respectively; these are both freely soluble bodies and will not stifle attack, although where they interact together in the presence of oxygen, they produce a mixture of oxides of iron (usually hydrated) known as rust. The presence of oxygen at the cathodic parts stimulates the flow of current and thus accelerates the corrosion; indeed, at low E.M.F.'s the presence of oxygen is usually needed for the corrosion to proceed at all rapidly. It may sometimes happen that oxygen is used up at one place (the cathodic zone), iron is corroded at a second place (the cathodic zone) whilst iron oxide (in hydrated form) is produced at a third place. In such a case, the final outcome of the corrosion is equivalent to an oxidation process, but it differs from direct oxidation in that the oxide (rust) is produced by a secondary reaction, and does not form a continuous protective sheath over the surface; consequently, it will not usualy stifle attack. Electrochemical corrosion will only stifle itself if either the immediate anodic or cathodic product is sparingly soluble, and is formed as an obstructive layer over the anodic or cathodic area, as the case may be.

The corrosion current may arise from an outside source, or may be generated by local differences in the metal or the liquid. The first possibility embraces numerous cases of rapid corrosion caused by stray currents. Some of these concern cooling systems. Van Brunt and Remscheid[1] describe the attack on the water-jackets of power rectifiers by their own current and show how it can be overcome by the addition of sodium chromate (the cause of the inhibition by chromates is discussed later).

The active attack upon the metal, in all these cases, occurs at least in the early stages at the anodic places, but it is a mistake to suppose that no change occurs at the cathodic places. If the liquid surrounding the metal consists of brine, the alkali produced at the cathode is likely to soften any oil-paint present, and may creep below and loosen other sorts of paints which it does not actually attack; the alkali may also cause deterioration to concrete or cement. Moreover, although *small* amounts of alkali inhibit the corrosion of most metals, larger concentrations may cause a renewal of the attack upon some metals, notably lead. American experience of the corrosion of cable sheaths by stray currents recorded by Burns[2] is that the corrosion at the cathodic parts cannot be neglected, although it is of a different type from that at the anodic parts. This attack upon lead by cathodically-formed alkali requires to be borne in mind in considering proposals for protecting underground metal against stray currents by making the whole system cathodic; in countries where such a system is used, *e.g.*, Italy and parts of Australia, it is found advisable to keep the cathodic polarisation within definite limits.

Natural Slow Corrosion

In the "natural" slow corrosion of metals which occurs even when stray currents are absent, the E.M.F. is attributable to local differences in the metal or the liquid surrounding it. There is definite evidence that electric currents really flow between different parts of the surface of rusting iron and, in such cases as are sufficiently simple for quantitative electrical study, it is found that these currents are strong enough to account for the whole of the corrosion actually observed[3]. Possibly, future work may show that direct oxidation is also occurring in some cases, since direct attack which, when acting alone, would stifle itself, might continue indefinitely if the obstructive oxide-film were to be continually undermined and removed by anodic attack. But, however this may be, the essentially electrochemical character of the corrosion-process is to-day hardly doubted. A simple apparatus[4] lately con-

structed at Cambridge, enables the current flowing over the surface of rusting iron to be read off on a dial directly.

The primary damage always occurs at the anodic parts of the self-generated circuits. But where the corroding liquid is brine, the cathodic product, sodium hydroxide, may produce undesirable changes in some cases, just as in the case of corrosion by stray currents. For instance, metallic lead may suffer corrosion at the cathodic spots, although it is a different type of attack from that noted at the anodic spots; the same occurs under certain circumstances on aluminium, tin, and, according to one view, on zinc. Iron tends to be protected from corrosion by alkali, but if the iron is covered by paint, there may be destruction of the paint at the points where sodium hydroxide is formed. Nine years ago, Haines and Evans[5] studied the behaviour of painted iron specimens partially immersed in sodium chloride solution. In such a liquid, provided that there is no stirring, the main cathodic area is situated at the water-line, where oxygen, the cathodic depolariser, is most rapidly renewed. Corrosion develops at anodic points at a perceptible distance below the water-line, but the alkali accumulating along the water-line, although tending to protect the iron, attacks the paint.

Effect of Variations

In a subsequent research in Cambridge,[6] extensive experiments were performed to study the effect upon alkaline softening of variations in (1) the varnish medium, (2) the surface condition of the steel, (3) the method of applying the varnish, (4) salt solution, and (5) the pigment, where present. It was found, for instance, that varnishes become much less susceptible if they contain copal resin. Since the date of that research (1928) the manufacture of paints and varnishes has undergone great improvement, and the development of synthetic resins adds greatly to the resources of the manufacturer; probably to-day it should be possible to produce coats which are relatively immune to alkaline softening. The matter is not without importance in the refrigerating industry.

The methods adopted to-day for rendering brine non-corrosive depend upon the addition of some substance which causes stifling either of the anodic or cathodic reaction. Perhaps the most efficient group of inhibitors, the chromates, may sometimes inhibit both reactions. Hoar and Evans[7] some time ago studied the mechanism of inhibition by chromates and discovered that they serve to precipitate the iron salts formed at susceptible spots in physical contact with the metal, so that the action stifles itself. Their poisonous and skin-irritant properties render their use unsuitable in cases where operators have to dip their hands into the brine, or where there is danger of spray being present in the air.

Anodic and Cathodic Inhibitors

Continuing, Dr. Evans said he had discussed elsewhere the relative utility of anodic and cathodic inhibitors.[8] Since the anodic area is the seat of the essential corrosive reaction it is natural to try and apply the suppression at this point, and most of the inhibitors used to-day are anodic inhibitors; they are mostly alkalies or alkaline salts. If sufficient anodic inhibitor is added to the water the corrosion may be prevented altogether. Unfortunately, the amount needed increases with the presence of chlorides in the water, although it seems likely that at very high concentrations of chloride the amount is smaller than at intermediate concentrations of chloride. Supposing that, owing to a miscalculation, the amount of inhibitor added is insufficient, then the total attack upon the metal is diminished, but the area attacked is also diminished. Unfortunately the reduction in the area attacked proceeds more rapidly than the reduction in the total corrosion, so that the corrosion per unit area attacked may actually be increased. In other words, an insufficient addition of inhibitors, *intended* to prevent the attack, may actually *intensify* it, and perforation may occur more quickly than if no attempt had been made to inhibit corrosion.[9]

Evidently anodic inhibitors are not, therefore, free from danger unless the amount needed is established with certainty by experience. Actually, in the refrigerating industry, anodic inhibitors are successfully employed, because the liquid to which they are added can be kept fairly uniform and the amount required has come to be known. An example of an anodic inhibitor in successful use is sodium phosphate. Cases of intensified attack due to an unfortunate combination of chloride and some alkaline substance are not unknown, although they probably occur mainly under conditions of irregular working; in one plant where, probably through leakage, some dilute salt solution containing ammonia (which had escaped from the refrigerating apparatus) stood in contact with steel, intense attack was produced.

Chromates and Alkaline Corrosion

Even chromates may produce alkaline corrosion if the ratio of chloride concentration and chromate concentration is an unfortunate one. But, as has been shown elsewhere,[10] this is less likely to happen with strong brine than with dilute brine, and is less likely to occur with calcium chloride than with sodium chloride brines.

Inhibitors which suppress cathodic reaction are generally less successful in stopping corrosion altogether, but they are free from the danger quoted already. If the amount added is too small, attack will not be prevented, but at least it will not be made more intense; there is no tendency to reduce the corroded area, and consequently the dangerous intensification of attack is avoided. An example of cathodic inhibition from the refrigerating industry is the sprinkling of zinc dust on the surface of the brine. This probably reduces the amount of oxygen entering the liquid, and since oxygen is a cathodic depolariser, the cathodic reaction, which is necessary for electrochemical corrosion, is restrained. In addition the zinc salts which are formed in the solution will tend to produce a film of zinc hydroxide on the cathodic portions of the iron, and this will also tend to suppress the cathodic reaction. Other modes of using cathodic inhibitors are under active investigation at Cambridge and elsewhere, but the matter cannot be discussed at length here.

Resistant Alloys

The recent development of resistant alloys, most of which depend upon the formation of a highly protective oxide film, has helped to solve many of the difficult problems of chemical industry in the last ten years. While these alloys are necessarily expensive their adoption for new purposes often may prove an economy in the long run, although the speaker possesses no special information on their behaviour towards brinne under the conditions obtaining in the refrigerating industry. If it is decided to use such an alloy for any purpose, great care should be taken in the neighbourhood of welds and places where the alloy has been cut, ground, bent or heated. Frequently, exposure of a newly cut surface to air for some time before it is put into service will increase the resistance; if this is impossible, treatment with some suitable oxidising agent may develop the protective type of film which gives protection. On this point the manufacturers are often in a position to give their clients better information than any private individual, having, almost necessarily, experience of analogous cases elsewhere. They should always be consulted where there is any question of welding, grinding or local heating.

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The Work of the Government Laboratory

Half a Million Samples Examined for Tax Gathering

ACCORDING to the report of the Government Chemist upon the work of the Government Laboratory for the year ended March 31, 1936 (H.M. Stationery Office, 9d.) the total number of samples examined in the course of the year, including those dealt with at the chemical stations, was 546,279, as compared with 522,788 in the preceding year, an increase of 23,491. The number of samples examined at Clement's Inn was practically the same as last year, but there had been increases of 21,500 at the Custom House and 2,500 at the Chemical Stations.

The incidence of new duties arising from Import Duties Orders, which either create additional duties, exemptions or drawback payments on certain classes of goods, tends to raise the number of samples submitted. With the adoption of fixed rates for articles of a stabilised composition, however, less sampling is needed in some classes. Decreases of 2,000 samples relating to hydrocarbon oils duty and also to silk duties have occurred during the year, whilst the number of samples taken under the Import Duties Act, Ottawa Act, and the older duties have remained nearly constant. A decrease in the number of British sugar samples was caused by a modification in the scale of sampling of molasses.

Condensed Milk

Forty-one samples of condensed milk, including five from Scotland and one from Northern Ireland, were sampled under the provisions of the Food and Drugs (Adulteration) Act. These comprised sweetened and unsweetened milks and milk powders. The samples were examined with a view to ascertaining whether there was evidence of the removal of any of the normal constituents of milk other than water during the process of concentration, and, if so, whether the packages were marked to that effect.

Fourteen samples of imported colouring materials were examined to ascertain whether they contained synthetic organic dyes, the importation of which, under the Dyestuffs (Import Regulation) Acts, 1920 to 1934, is prohibited except under licence.

The total number of samples examined in connection with hydrocarbon oils duty was 14,831, of which 8,693 were from imported and 6,082 from exported goods, the remainder being wrecked goods. Of that total, 8,558 were hydrocarbon oils and 6,273 were miscellaneous composite goods, such as enamels, lacquers, leather colours, paints, varnishes, garage preparations, road dressings, solvents, insecticides medicinal and toilet preparations, essential oils, lubricants, printers' ink, etc. A number of samples was examined with a view to determining whether illegal mixtures of kerosene with motor spirit were being sold, since it is not allowable to mix dutiable with rebated oil except under licence and repayment of the rebate. Evidence of such admixture was adduced in two cases, both of which were the subject of legal proceedings decided in favour of the Crown.

A New Saccharometer

A new saccharometer for use in breweries and distilleries has been designed in the Laboratory and, after exhaustive tests under practical conditions of working, it has been approved by the Customs and Excise Department.

During the past year 9,669 samples were examined for the Safeguarding of Industries Act. The object of the examination in most cases was to ascertain (a) whether the product was such as to come within the class of those liable to duty; or (b) whether, in the case of the substances such as medical preparations bearing trade names without disclosure of their ingredients, the imported article contained any substance liable to duty, and, if so, in what proportion. Fifty of the samples were examined in connection with claims for drawback of duties on exportation.

Methyl alcohol, either as wood spirit, which consists mainly of methyl alcohol, or synthetic methyl alcohol, is not liable to spirit duty on importation unless it is purified so as to be potable, and it is then charged as ordinary spirits (Spirits Act, 1880). Synthetic methyl alcohol is, in any case, liable to Key Industry Duty. Of 44 samples of imported methyl alcohol, one was found liable to duty on the grounds of potability.

Examination of Fusel Oil

Fusel oil, which consists largely of propyl, butyl and amyl alcohols, is a by-product in the manufacture of ethyl alcohol, and is of considerable commercial importance as a raw material for the manufacture of solvents for lacquers, varnishes, etc. Fusel oil, whether imported or home produced, generally contains ethyl alcohol as an impurity, but duty is not charged on such ethyl alcohol unless upwards of 15 per cent. of proof spirit is present. Sixty-four samples were examined for this purpose. Forty-three samples of fusel oil from British distilleries were examined. Of these, two were found to contain more than 15 per cent. of proof spirit, and delivery out of revenue control was refused until the proportion of spirit had been reduced.

The number of samples of sugar and articles containing sugar or other sweetening matter examined for assessment of duty or drawback was 79,533, as compared with 71,516 in the preceding year. This number does not include those substances which contained spirit in addition to sugar.

In connection with the assessment of duty on British-made glucose, 295 samples were taken during the course of manufacture; 660 samples were examined for assessment of drawback on exportation, and, in addition, 48 samples of imported glucose and of glucose used in syrups made at sugar refineries.

Saccharin has to be searched for in preparations in which there is any probability of its occurrence; 48 samples of imported substances were specially examined with this object, and in a large proportion saccharin was present. Most of the samples contained some other dutiable ingredient such as sugar, spirit or chloroform, and this had also to be determined for the purpose of assessing the amount of drawback payable on exportation, and 90 samples of saccharin and of the materials used in its production were likewise examined in connection with the assessment of duty on saccharin manufactured in this country.

Beet Sugar Manufacture

Samples of beet-pulp, beet juice, molasses and refined sugar, 2,950 in number, were examined in connection with British sugar manufacturing operations, and for assessment of the duty to be charged and the subsidy to be paid. The decrease of about 2,000 from last year's total is principally due to a reduction in the scale of sampling of the molasses.

Members of the staff of the Government Laboratory gave evidence in legal proceedings in 51 cases. These were in connection with the illegal possession of prohibited drugs, poisoning; alcohol in blood; smuggling of opium, tobacco, or saccharin; false declaration of imported goods; illicit distillation of spirits, or brewing; adulteration of beer; irregularities in the sale of wines, sweets, spirits or table waters; unlicensed manufacture of tobacco; illegal mixture of petrol with kerosene; addition of water to milk, and salmon poaching.

NEGOTIATIONS have been carried on in Roumania for the purpose of establishing a zinc oxide cartel. There are four concerns in Roumania manufacturing the pigment, the Solex Co., the Coroana works and Zimmer and Co., all of Bucharest, and the Phoenix Chemical Co., in Baia Mare.

Preventing Corrosion at Chemical Works

By H. SEYMOUR

THERE are several general principles which underlie all methods of corrosion prevention. The problems of the inside and out of a chemical works have little in common in corrosion prevention, for whereas the chemical engineer has a very wide selection for his indoor equipment, the structural engineer who houses this plant has a very narrow field from which to choose.

In building construction, the unfortunate situation exists that the only metal suitable for structural purposes is, from the corrosion standpoint, chiefly distinguished by the ease with which it is attacked, particularly by acids. When bare steel is used, this frequently introduces a serious problem, for in most chemical plants acid fumes of one kind or another are likely to be present occasionally, if not chronically. As there is no commercial method of rendering structural steel inherently acid-proof, about the only solution practicable is to keep the acid away from the steel. Even the relatively low concentration of acid in the furnace gases of locomotives has been known to stimulate corrosion in overhead girders to such an extent that it was necessary to concrete the structure to prevent failure. In general, this illustrates in principle about the only practicable method of corrosion prevention in buildings—if the material or materials of construction are attacked by any of the gases or liquids present, contact must be prevented. With steel buildings, the question usually resolves itself into the use of concrete, tile, brick, or paint, for protection of the walls, roof-trusses, etc. In any building of this type, the normal concentration of corrosive gases must be low, otherwise the building would be uninhabitable, so that the problem is in some respects simpler than the protection of apparatus.

The Properties of Concrete

Concrete, as well as most of the other structural materials used in conjunction with steel, possesses the disadvantage of being somewhat porous, so that corrosive gases and liquids can penetrate to the embedded steel. In such a case, the expansion of the steel due to the formation of more bulky corrosion products may crack the concrete or other surrounding medium. In order to alleviate this condition, the steel is sometimes covered with a layer of neat cement, thus maintaining an alkaline condition in the immediate neighbourhood of the steel. Effective ventilation in a building, by diluting the gases, would minimise this effect, and would also improve general working conditions. Where embedding in tile, concrete, brick or other non-metallic materials is not practicable, the only recourse is through pointing and periodic inspection. For exposure to acid fumes, non-metallic materials, such as tile, brick, and concrete, are in general more suitable than steel, as being less affected by a low concentration of acid fumes. Certain special steels, notably the copper-bearing ones, have shown their value under these conditions also.

The floors of buildings in which corrosive materals are handled present a problem in themselves, as floors are not only exposed to corrosive gases, but also, on account of spills, leaks, etc., to any concentration of almost any corrosive substance To prevent destructive action by these materials, there are two obvious remedies; the floor may be covered with an impervious, unattackable material, or provision may be made for removing corrosive material immediately. The best method would make use of impervious unattackable flooring material, and provide ample facilities for washing down rapidly when any spill or leak occurs. In such a case, ample floor drains, properly placed, should be provided, with means for obtaining a large supply of water. The choice of flooring must depend on the nature of the materials being handled. Steel or concrete would be satisfactory for caustic, and mastic or acid-proof brick for acids.

Outside steel equipment, such as storage tanks, which may be exposed to acid fumes and are thus subject to accelerated rusting, may generally be best protected by painting, preferably with a paint of the asphaltic type, or aluminium, though cement coating has been used with success for this class of work.

The danger element from apparatus is generally due to the mechanical failure of some portion, consequent upon its weakening by corrosion. The obvious and perfect remedy for this is to select materials for apparatus construction which are not attacked by the materials being handled, but this is more eaSlly said than done. Each new reaction is a problem in itself, and the selection of the proper material may involve considerable research. This is true to such an extent that some perfectly feasible reactions have never been commercially dveloped on account of the impossibility of finding equipment in which to carry them out. An example of this is the process for recovering as hydrochloric acid the chlorine of the Solvay process; the process, however, requires fusing anhydrous phosphoric acid, a treatment which no known material will withstand.

Selection of Material

In selecting a suitable material for apparatus construction, the first difficulty encountered is the very limited field from which the choice must be made. If only resistance to corrosion were required the choice would be simple; selection is complicated by the fact that the material must also have suitable mechanical or physical properties. Still more unfortunately, the materials of suitable physical properties are very likely to be entirely unsuitable chemically, and *vice versa*. From the point of view of strength, the ease of working, and other mechanical properties, the ordinary ferrous metals leave little to be desired, but, unfortunately, they are readily attacked by acids, and, if alloyed so as to increase their acid resistance, they often become either unsuitable physically for structural work, or highly expensive. Since the average life of chemical apparatus is rather short, it must be constructed of relatively cheap material. In calculating this cost it should be figured as added to the price per pound of the material produced in the given piece of equipment during its useful life, otherwise the results may be distinctly misleading.

Combination of Materials

On account of the chemical unsuitability of many of the materials possessing suitable mechanical properties, and *vice versa*, the chemical engineer is frequently forced to the experient of combining two materials in such a way that one supplies the mechanical strength, the other the resistance to corrosion. Although this type of construction is quite common, as evidenced by the use of a large number of lined vessels (lead-lined, enamelled, tile-lined, copper-lined, silver-plated, etc.), it is, strictly speaking, a subterfuge to evade the difficulty of no one suitable material existing. Often, since a lined vessel of any sort really consists of two vessels, one within the other, the probability of faults of some sort is multiplied by two. Since the material furnishing the mechanical strength in this type of construction is usually readily attacked by the material being handled, a spill or a pinhole in the lining may also cause extensive or rapid destruction of the stronger metal. For this reason, the lined type of construction, although frequently used, cannot be considered a final solution.

The first line of defence in constructing apparatus for handling dangerous material is to select a structural material as far as possible unattacked under the conditions. However, since there is a possibility of ultimate failure—either in whole or in part—if there is any corrosion some provision must be made so that this failure will not endanger the operators.

The nature of the provision to be made and precautions to be taken depends, of course, on the nature of the operation and material being handled. Briefly, the conditions to be taken into account are the physical condition of the vessel contents (solid, liquid or gas), the nature of the risk therefrom (whether due to the inflammability, toxicity, or corrosiveness), and the temperature. The general principle to be borne in mind in safeguarding such equipment is that, when the escape of material takes place, contact with the operator must be prevented. The provision for accomplishing this mechanically depends on the nature of the reaction vessel, which may operate at atmospheric or elevated pressure, handling solids, liquids, or gases, either inflammable or non-inflammable.

Explosions and Fire Risks

Explosion or fire danger from the accidental escape of inflammable material can obviously be avoided by having present nothing capable of igniting the mixture. This would require vapour-proof globes to be used, static to be eliminated by suitable grounds, open flames forbidden, etc. It should be borne in mind that many substances can be ignited without contact with a flame, the temperature of spontaneous (and instantaneous) ignition being sometimes as low as 150° C., so that steam pipes, or the friction of a gas passing through a pipe at high velocity, may serve to ignite the gas; also that a current of inflammable gas may drift a considerable distance in dangerous concentration, so that all possible ignition sources must be removed to a safe distance or provision must be made by suitable ventilation for the immediate dilution of the inflammable gas below the explosive concentration.

With the fire or explosion risk properly safeguarded against, the remaining precautions necessary can be largely confined to the neighbourhood of the reaction vessel. Obviously, the fundamental difference between apparatus working under ordinary pressure and that working under raised pressure is that, in the case of a leak, the contents of the latter escape more rapidly, and an explosion is possible in which the vessel itself may become the danger element. Taking the explosion risk first, the obvious way to prevent explosive failure, due to weakening of the entire vessel by corrosion, is frequent inspection to ensure that the material retains its original thickness and structure. This last is important, as in many cases metals may suffer heavy corrosion, with serious loss of strength, without change in dimensions; brass, for instance, may become, through dezincification, a loose porous mass of spongy copper, cast iron a graphite-like body, etc. The inspection should therefore be thorough, so that it will be certain not only that the thickness is still sufficient, but also that the metal still possesses the necessary physical characteristics. The method of inpection, of course, will vary with the equipment. Test holes may be drilled, and later welded or otherwise plugged, the thickness measured directly; in some cases X-ray photographs can be taken. Periodic hydrostatic tests should also be applied, at a pressure of at least 50 per cent. above the working pressure being used.

General Safety Precautions

In all vessels handling corrosive material, the principle to be observed is to remove such material to a safe place, or render it harmless, without permitting it to come in contact with the operators. In the case of vessels handling solids the problem is relatively simple, as solids do not leak readily and are relatively non-corrosive, so that the problem is really one of preventing dust poisoning or ignition. In the case of vessels containing liquids, the apparatus should be installed in a casing of light sheet steel on suitable material, either tight at the bottom and capable of holding a charge, or drained to a suitable receiver. This arrangement can frequently be made at slight additional cost, if borne in mind the original design. Caustic firepots, for instance, are commonly placed above settings capable of holding a charge of caustic. Autoclaves should be cased, so that in the event of a leak the material will be prevented by the case from being forced directly out into the operating space. The casing should extend down to a floor, so that no one can walk under the apparatus, and if the material gives off poisonous vapours, the casing should be ventilated thoroughly.

For vessels employed in handling toxic or corrosive gases, the usual method is to provide means of removing the gas and diluting it below the danger point before discharging into the air. The degree of thoroughness of removal and extent of dilution necessary depends on the nature of the toxic substance. Some, like cyanogen chloride, produce such unpleasant symptons in less than lethal concentration, and so force the immediate abandonment of the neighbourhood; others produce little or no effect till a dangerous concentration is reached. Each gas is really a problem in itself, but the general principle of rendering the escaping gas harmless by dilution is the most practical to use in the majority of cases.

Safety Valves and Discs

Where safety devices are used in connection with corrosive chemicals, the behaviour of these under the working conditions becomes very important. Safety valves may be stuck down by cement-like corrosion products, vent lines may be completely stopped in the same way. In one recorded case, a fusible plug in a boiler, intended to prevent overheating, was rendered infusible by corrosion, a boiler explosion resulting. Safety discs are more dependable than safety valves, as corrosion usually weakens the disc and thereby increases the factor of safety on the autoclave. Also, on account of the small weight of metal in a safety disc, expensive metals can be employed if more suitable from either the chemical or mechanical point of view.

In the actual design of the apparatus, the working conditions must control the design, so that general rules could hardly be laid down. A few points, sometimes ignored, might be mentioned. It is well recognised that galvanic couples or combinations of dissimilar metals should not be used in an electrolyte. It has frequently been overlooked, however, that a rivet or staybolt in a plate may constitute such a couple, due to the working of the metal of the rivet or bolt, or the inclusion of oxide in the joint. A weld may similarly set up a potential sufficient to cause rapid failure, so that apparatus subject to electrolyte corrosion should contain the minimum number of joints, and those hammer-welded and impurity-free as far as possible.

Sharp Corners Should be Avoided

Since corrosion takes place faster at an angle or intersection of two planes, sharp corners of any sort should be avoided in apparatus subject to such action; also, sharp corners and crevices are difficult to clean, and consequently present a hazard in making repairs. Corrosion is stimulated by velocity, particularly when turbulent, so many parts subject to the action of liquid in turbulent flow should be made easily replaceable or extra heavy, or both. Another reason for simplicity in design is to facilitate repairs. If possible, the apparatus should be so designed that any parts subject to corrosion can be readily removed, and worked on outside the vessel; that is, it should not be necessary to enter the vessel to make repairs. The vessel should also be of such simple inside design that it can be thoroughly cleaned from the outside before being entered for inspection and repairs.

A NET profit of $9,572,105, equivalent to 62 cents per share on the common stock after allowing for preferred dividend, is reported for the third quarter of 1936 in the quarterly statement of the International Nickel Co. of Canada, Ltd. This compares with a net profit of $9,070,186 for the previous quarter, equal to 59 cents per share. Net profit for the first nine months of 1936 was $27,029,079, as compared with $18,080,827 for the similar period in 1935, or $1.75 per share as against $1.14 a year ago.

Dr. L. A. Jordan Propounds Four Riddles

Implications of Chemistry

Dr. L. A. Jordan, Director of the Paint Research Station, Teddington.

DR. L. A. JORDAN, director of the Paint Research Station, read a paper on "Implied Chemistry" before a recent joint meeting of the Glasgow Sections of the Society of Chemical Industry and the Institute of Chemistry, and the Scottish Section of the Oil and Colour Chemists' Association. In no other country in the world, he said, is there any confusion between chemists and pharmacists; in this country, not only is the qualification of the pharmacist given by the Pharmaceutical Society, but these gentlemen can also call themselves apothecaries and druggists; contrariwise they prefer to use the title "chemist" which according to the law they are fully entitled to do.

So recently as 1908, a Poisons and Pharmacy Act was passed which conferred the right on trading companies to use the word "chemist" provided a qualified "pharmacist" was in charge. To most people that sounds rather comical, but it is really very tragic, and why? One reason is that a pharmacist is a pharmacist because he is vetted and qualified by the Pharmaceutical Society, which can and does speak for all pharmacists. That both people and Parliament can understand.

But who speaks for chemists? The Chemical Society, the Institute of Chemistry, the Society of Chemical Industry, the British Association of Chemists, to say nothing of a multitude of specialist societies catering for specialised groups—the Dyers and Colourists, the Oil and Colour Chemists, the Rubber Technologists, the Chemical Engineers, and the rest? No one knows. We are beaten on organisation, and our professional epitaph should read, "Here lies chemistry—she died of a surfeit of adjectives."

Where Stands the Chemist?

Where is the chemist rated to-day by the public? We rejoice in the fact that the various branches of science (and chemistry is prominent among them) enlist some of the nation's best brains and the most disinterested enthusiasms of our time, and that the love of knowledge and the ideal of moral uprightness is found at its best in the scholar—but what of the mass of ordinary chemists? Are they scholars? Do they in fact live up to one's ideas of a professional man?

The general public has little or no precise appreciation of things chemical, even when such things intimately affect everyday life, but they are not slow to appreciate right personality. The Press, who should instruct, signally fail to do so because so much of newspaper writing is below the intelligence of the readers; unless some item can be called "news" and given a dramatic quality not much below that of a murder trial, there is little chance of scientific work getting more than perfunctory notice. The various societies spend considerable sums in inviting representatives of the Press to dinners and functions, and for what—a few lines in an obscure part of the paper concerned, and not always even that.

Probably our world sees us as quite ordinary men working in the ordinary way even if there is something a little mysterious and queer about it at times. To our intimates some appear to be reasonably prosperous and some are underpaid even for the work they do; some complain of being exploited and misunderstood; some are indifferent and quite a few pass by on the other side. But to ourselves as a profession, we show ourselves to be a heterogeneous medley of factions which may be likened to the Balkan States (pre-1914 grade) of the scientific world.

The mania for specialisation is leading to the creation of armies of adjectival chemists who steadily and consistently by their actions deny the mother who gave them birth, whose name is just Chemistry, plain unqualified Chemistry. A man who would be true to his calling must recognise that he is first and foremost a chemist and an oil chemist or a rubber chemist as the case may be afterwards. His conduct and his subscriptions must be regulated accordingly not only as a matter of principle and honour, but as a matter of common sense and simple insurance of his professional standing.

Out of these considerations one can even propound riddles: Why are chemical societies more quarrelsome than physical ones? Why have the physical societies been able to do without fuss and bother what the chemical societies have been talking about for years? Why is chemistry the most conservative of the sciences? Why is it that so much of modern chemistry is being expounded by physicists?

Any fair-minded person capable of surveying the world of chemistry as a whole is forced to the conclusion that chemists are valued and rated by the community just where they deserve—neither more nor less. It is no use complaining and saying that the chemist is as important to the community as a solicitor or a medical man. If solicitors were like us those who draw up conveyances would be very doubtful indeed about the low fellows who work in police courts, and if either belonged to any professional society at all they would certainly be in different camps. Should the opportunity arise of making some representation to the community through Parliament on a matter of mutual interest the odds are that the two camps would cancel one another out! The public has no use for childishness, however clever a man may be.

Pharaohs Who Know Not Joseph

Chemical work is like most other kinds of work—there are comings and goings, and new Pharaohs arise who know not Joseph. When Joseph is rejected he finds it rather hard, and the plain fact is that such chemists rank with the rest of the unemployed when they are unemployed—it simply means that society has no use for them. During the training period, we have an examination system which throws out a certain proportion, as it were, at each sifting, but one of the painful things one discovers as one gets older is that the sifting operations go on continually throughout life. Perhaps they are fortunate who are rejected soon enough to be able to take up something else. Perhaps, again, some of these tragedies could be avoided if the men concerned had ever asked themselves the question: "Why should anyone employ me at all?"

The prevalent idea that to study the science of chemistry means that one must practise the craft professionally is the reason for many tragedies among the misfits, but the result in terms of misfortune depends on the individual. I remember four cases which came to my notice about the same time, all men at about 30 years of age who were forced to realise that they would never be a success as chemists in industry. I know their after-history, but only one of the four ever did anything: he started in business with a small fried fish shop. The

venture was successful, and it was not long afterwards that I heard that he had five such shops. I have no doubt, though I have not heard of him for some years, that he is by this time a chain-store magnate.

There is an extraordinary subtlety about chemistry which is not easily understood by other than chemical minds (and here a chemical mind need not carry a chemical degree), a circumstance that provides both the entrancing pleasure of chemical philosophy and the great peril of chemical practice.

The curse of the chemist has always been his narrow outlook—we are too fond of labels and that brings me back to organisation. There is no need to review the many societies and associations having connections with chemistry, or the relationships between one and another. I will only refer to the last one, the Chemical Council which has been formed as a mild form of co-operation between the Chemical Society, Society of Chemical Industry, and Institute of Chemistry. The coming of the Chemical Council is the last, if belated, effort to discover the secret of unity. It has come quietly and modestly into the world of chemistry in which the idea of co-operation though much in mind of recent years has not made such progress. Perhaps the slow progress has been due to fear—fear of the little fish being swallowed up or absorbed by the big fish. We have to show that these fears are unfounded because, at the worst, the degree of union contemplated and hoped for can only be in the nature of federation—adhesion or *ad*sorption to the common principle and a common anchorage. There is a great difference between adsorption and absorption. Every society must seek to promote the dignity and standing of the profession of chemistry by bringing its members to accept a high code of honour, a strict test as to qualifications, and the principle that as chemists we are all one family—all supporting things and institutions for the good of the cause and not for what we may get out of it.

All our different outlooks, whatever our interests and sympathies, can be composed, if we adhere to the ideal of chemistry first, qualified chemistry second, and no lonely furrows. The world of chemistry awaits its Messiah! Whence will he come? Shall we fail to hear him for the noise of our discords? I hope not.

Chemical Industry Finance

By S. HOWARD WITHEY, F.C.I.

THE net profit of £10,262 realised by Lawes Chemical Co., Ltd., during the financial year to the end of June last, compares with £10,606 shown in the previous tabulation, and the dividend of 5 per cent. was repeated. Registered in 1872, the company owns a direct controlling interest in W. S. Ferguson and Co., Ltd., and the Jersey Trading Co., Ltd., and has an authorised capital of £400,000 During the same accounting period, a trading profit of £95,584 was made by Anglo-Continental Guano Works, Ltd., and after charging administration expenses, debenture, interest and depreciation, the balance of net profit worked out at £54,337. This figure compares with £50,437 shown in the previous account, and in addition to repeating the ordinary dividend of 7½ per cent. the reserve allocation was increased to £15,000, leaving a balance of £42,707 to be carried forward, as against £42,933 the previous year.

Coal Distillation Profits and Losses

The audited accounts of British Coal Distillation, Ltd., covered the twelve months' operations to November, 1935, and revealed a loss of £14,414. This has the effect of increasing the deficit to £61,161. Of an authrised capital of £900,000, a total of £527,033 has been issued and paid up, consisting of £214,839 in ordinary £1 shares, and £312,194 in deferred shares of 5s. each. The figures submitted by the directors of Thorncliffe Coal Distillation, Ltd., covered the financial year to the end of June last, disclosing a net profit of £54,935, which compares with £51,949 realised during the preceding twelve months, and enabled a dividend of 25 per cent. to be paid on the ordinary shares, also the preference dividend for the two years to June, 1936. The sum of £10,000 was transferred to reserve, leaving a credit of £15,344 to go forward, as against £26,288 brought in. Registered in 1920, this company has an authorised capital of £550,000, of which a total of £432,672 ranks for dividend, *viz.*:—£393,338 in 8 per cent. cumulative preference £1 shares, and £39,334 in ordinary shares of 1s. denomination.

During the year to June last the Staveley Coal and Iron Co., Ltd., made a trading profit of £594,634, and after providing for depreciation, etc., the net profit proved to be £380,285, which compares with £316,289 shown in the previous profit and loss statement, enabling the dividend to be raised from 8 per cent. to 9 per cent., and £50,000 to be transferred to the reserve, which now amounts to £1,050,000. Registered in 1863, this company has an authorised capital of £4,000,000, of which a total of £3,385,356 has been issued in ordinary £1 shares of one class. The company owns all the shares of several companies. The Buell Combustion Co., Ltd., sustained a net loss of £15,194 during 1935, and this increases the deficit to £55,185.

The accounts of the Paterson Engineering Co., Ltd., were made up to the end of April last, showing a net profit of £13,333 after providing £6,410 for taxation. The rate of dividend was maintained at 10 per cent., and the carry forward raised from £7,529 to £10,057. The authorised capital of the company is £200,000, of which £175,000 ranks for dividend, comprising £75,000 in the form of 5½ per cent. cumulative preference £1 shares and £100,000 in ordinary shares of 10s. each.

Dyestuffs Manufacture

The United Indigo and Chemical Co., Ltd., realised a net profit of £8,418 during the year to June last. This compares with £8,720 shown in the previous account, and the dividend was raised from 5 per cent. to 6¼ per cent., by reducing the carry forward from £16,780 to £16,291. The company controls numerous indigo and chemical manufacturing concerns, and of an authorised capital of £300,000 a total of £142,500 ranks for dividend, *viz.*:—£90,000 in the form of 5 per cent. cumulative participating preference shares of 7s. 6d., and £52,500 in ordinary shares of 2s. each.

The Yorkshire Dyeing and Proofing Co., Ltd., made a trading profit of £39,191 during the year ended June 30, which figure compares with £33,441 revealed in the previous tabulation. The balance of net profit worked out at £24,857, as compared with £20,809, and consequently the dividend was raised from 7½ per cent. to 8 per cent., absorbing £15,200, and after placing another £7,500 to reserve, the carry forward amounted to £7,521 as against £5,364. Registered in 1920, this company has an authorised capital of £190,000, all of which ranks for dividend in the form of 10s. shares of one class. During the same period a working profit of £470,888 was made by the Calico Printers' Association, Ltd., but after meeting debenture interest there was a loss of £47,247, necessitating a transfer of £50,000 from the reserve.

A profit of £33,109 was realised by Lafarge Aluminous Cement Co., Ltd., during the twelve months' operations to March last. This represents an increase of £8,472 in relation to the previous year's figure, and although no dividend was announced the sum of £33,000 was transferred to the depreciation reserve, and the carry forward increased from £971 to £1,080.

Letters to the Editor

How to Balance Exports and Imports

SIR,—Realisation is growing that imports and exports of goods and services between countries must balance—the one must pay for the other. The system of bi-lateral agreements lends emphasis to this. Yet these agreements do not allow either of the contracting parties to sell as much as they would like to sell to the other—or in other words, their productive capacity is not fully absorbed. Equally, neither side buys from the other to the fullest extent of consuming capacity, to attain which need not necessarily interfere with home production. Productive capacity and consuming power are therefore idle or restricted on both sides.

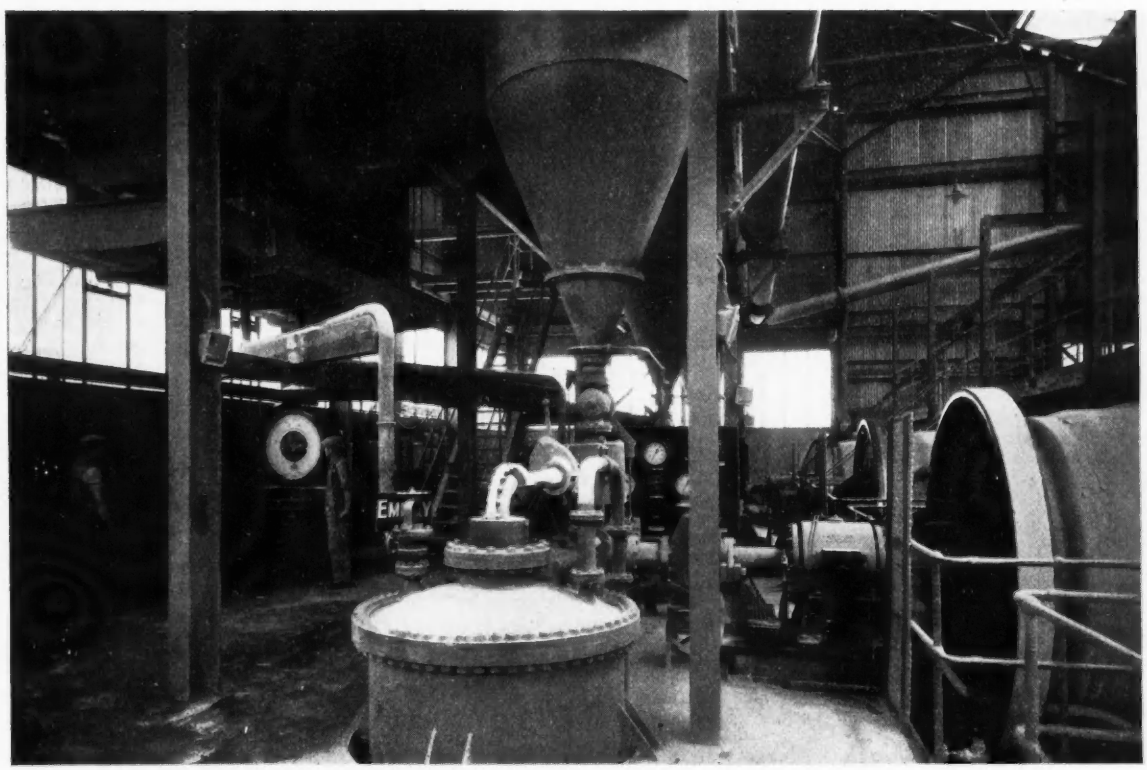
How is the gulf to be bridged, short of every Government throughout the world agreeing at the same time to permit absolutely free and unrestricted imports and exports? That is what most people would probably like to see. Apart from the recent gesture by the Governments of England, France, and the United States towards stabilised currencies, and the hope that some amelioration of trade restrictions will follow, there has been little or no effort to study from the *import* angle how international trade might be expanded. As the benefits of bi-lateral agreements are mutual, and exports must be paid for by imports or vice-versa, surely it should be possible to devise a suitable arrangement whereby trade in both directions might be almost unrestricted so long as an equitable balance is maintained, and without any fear of dumping or wholesale price disorganisation. And if that is so, should not the facilitation of imports—automatically accompanied by exports—be the main concern of Governments. It would surely be cheaper, and with the knowledge that every import represents a corresponding export more profitable, to maintain an imports credits guarantee department and other kindred organisations, rather than those we now have. The heavy expenses of international trade are at present attached to the exporting end, which is least able to bear them, whereas if we reversed the order of things those expenses would be largely transferred to the importing end. This, in itself, might provide any restraint thought desirable. I would welcome the views of your readers on this subject. The Institute of Export is anxious to investigate every possible way, no matter how unconventional, of assisting our hard-hit export trade.—Yours faithfully,

R. J. TURNER,
Chairman, Institute of Export.

11 Aldwych, W.C.2.

New Superphosphate Factory at Avonmouth

WE reported last week the opening by Sir Robert Horne of the new superphosphate factory for National Fertilisers, Ltd., at Avonmouth, which is to be visited next Wednesday by members of the Chemical Engineering Group and the Bristol Section of the Society of Chemical Industry.



The accompanying photograph shows the interior of the autoclave building, with autoclaves and rock charging equipment. Three autoclaves have been installed, each with a capacity of 25,000 tons per annum. They are cylindrical homogeneously lead lined vessels, each steam jacketed to enable the correct temperature to be maintained during the process, and they are built to withstand both pressure and vacuum. During the operation they rotate slowly. The amount of finely ground rock phosphate and sulphuric acid required for each charge is automatically weighed and introduced into the autoclaves through special valves.

New Technical Books

CEMENT DIARY, ZEMENTKALENDER 1936. 25th edition. Edited by Deutscher Zement-Bund G.m.b.H. Berlin-Charlottenburg: Zementverlag G.m.b.H.

A small insignificant diary only gives this little handbook its name; the publication is actually a technical work with an abundance of scientific data. In addition to a list of the well-known German experimental stations for Portland cement, iron Portland cement, and smelting cement, there are chapters dealing with cement standards, terms of delivery, bonds for mortar and concrete, concrete and reinforced concrete buildings, concrete articles, domestic buildings, air-raid shelters, road buildings and agriculture.

* * *

THE PHENOMENA OF POLYMERISATION AND CONDENSATION. A General Discussion held by The Faraday Society. Pp. 412. Gurney and Jackson. 22s. 6d.

The sixty-third general discussion of the Faraday Society (being the fourth colloid meeting organised by the Colloid Committee of the Faraday Society, which comprises representatives of the Royal Society, the Biochemical Society, the Chemical Society, the Faraday Society, the Physical Society, the Physiological Society, and the Society of Chemical Industry), was held at Cambridge, September 26 to 28, 1935. The subject under discussion, "The Phenomena of Polymerisation and Condensation," is here reprinted in convenient form for reference library use.

* * *

PERFUMES, COSMETICS AND SOAPS, with especial reference to Synthetics. By William A. Poucher. Vol. III. Being a Treatise on Modern Cosmetics. Fifth Edition. Pp. 228. Chapman and Hall, Ltd. 21s.

Changing tastes make it imperative for all manufacturers, and even independent pharmacists, to be *au fait* with every aspect of each type of toilet preparation on the market. Their manufacture is fraught with all kinds of pitfalls to the chemist who has not had wide practical experience, and it is safe to say that this book may quite easily be the means of saving both time and money to any practical worker. The continued development of modern cosmetics and their attendant chemical research has necessitated the re-editing of a considerable part of the book. There are two new chapters dealing with (a) rouges and eye cosmetics, and (b) sunburn preparations, the latter written in the light of the present knowledge of fluorescent filters which should facilitate the successful marketing of all such products. Much new matter has been included on bath crystal chemicals, sulphonated alcohols, after-shave preparations, cleansing, lubricating and bleaching creams.

* * *

THE CHEMISTRY OF THE COLLOIDAL STATE. By John C. Ware. Second Edition. Pp. 334. Chapman and Hall, Ltd. 18s. 6d.

The rapid development of the chemistry of the colloidal state and the amost universal interest in the subject are outstanding features of modern chemistry. There is, indeed, no industrial process that does not involve at one stage or another some principle of colloid chemistry. No only do we find that many of the problems of all types of industrial operations are those of the colloid chemist, but it is becoming more and more apparent that the student in all the fields of chemistry is constantly requiring a greater knowledge of at least the fundamentals of the subject. The purpose of this book is to present the fundamentals of colloid chemistry as they are disclosed by an alalysis of the material now available. The subject matter is presented with numerous journal references so that the student will be encouraged to do further reading and research. Special emphasis has been laid upon the applications of colloid chemistry to work in the field of chemistry in general and to the student's everyday life. In order to assist in the presentation of the subject, the sections are summarised and review questions are included.

HANDBOOK ON OFFENSIVE TRADES. By David Ronald. Pp. 204. William Hodge and Co., Ltd. 15s.

This book has been prepared primarily for the use of medical officers of health, sanitary inspectors, and other local authority officials concerned in the administration of the law relating to, and the supervision of, statutory offensive businesses, and of students preparing to undertake these duties. At the same time the writer has kept in view the needs of those who own or contemplate the establishment of such businesses. Considerable attention has been given to many details which at first sight may appear to be trivial, but in reality are matters of importance in respect that the neglect of these details may render plants that are otherwise elaborate and efficient ineffective to prevent nuisances arising therefrom. The contents of the book represent the fruitage, not only of long personal experience, but also of careful laboratory experiments covering a period of over two years and of subsequent experiments on a large scale carried out in factories through the courtesy of the owners. There is a foreword by Sir Leslie Mackenzie.

* * *

GENERAL CHEMISTRY. An Elementary Survey Emphasising Industrial Applications of Fundamental Principles. By Horace G. Deming. Fourth Edition. Pp. 769. Chapman and Hall, Ltd. 17s. 6d.

College courses in general chemistry differ widely in their content and method of development. Even when the common ingredients of a course are present in definite proportions, there may be great differences in the manner of their intermingling. It is hoped that this book may be appreciated for the things it has left unsaid. Most tests contain too much matter that properly belongs to a course in descriptive inorganic chemistry for students specialising in chemistry. By sacrificing such museum material as hypobromous acid, phosphoryl chloride, hydrazoic acid, and the usual long catalogue of variously coloured inorganic salts, space has been gained for the development of such topics of lively interest as hydrogen-ion concentration and its applications, electrochemical principles, and the constitution of matter. This edition has had the benefit of suggestions from many teachers who have used the three previous editions. Some space has been given to the remarkable progress of the last few years in atomic structure, crystal structure, catalysis and photochemistry; yet more compact presentation elsewhere has prevented any great increase in the number of pages.

* * *

THE SCIENCE MASTER'S BOOK. Series II. Part I—Physics. Part II—Chemistry and Biology. Edited by G. H. J. Adlam. Pp. 273 and 252. John Murray. 7s. 6d. each.

Frequent references to the first series of the "Science Master's Book" and the measure of success which it achieved, led the committee of the Science Masters' Association to think that a second series might be found acceptable. As in the first series, many of the notes are original; on the other hand, several whose names are added to the notes emphatically disclaim original authorship. The book is necessarily a scrap book, and it has been thought best to adopt a bald alphabetical classification, supplemented by a displayed list of titles at the beginning and an index. Nearly four hundred features concerning experiments or experimental constructions are included. With reference to the subject of surface tension, in Part I, for instance, there are features concerning the size of drops at the surface tension of water; included in a section devoted to spectroscope accessories there is the description of a sodium flame attachment for a petrol gas burner, and of an arrangement for viewing absorption spectra. Considered as a whole, the book contains a wealth of interesting and instructive details for carrying out experiments in the various branches of physics, chemistry and biology, many of the experiments being of a type which is very suitable for use as lecture experiments, and for school visiting-day receptions.

Developing Uses for Lead

A New Technical Information Bureau

THE inauguration of a lead products technical information bureau was announced at a recent meeting of the Lead Industries Development Council, by the chairman, Mr. H. S. Tasker. The Council was established some months ago under the auspices of the majority of the producers and manufacturers of lead sheet and pipe, white lead, red lead and lead oxide, of this country. Its general aim is to develop lead as a modern material capable of competing successfully with kindred building materials and to increase and extend the use of lead and lead paints in every useful field of application. In the field of research, for example, it aims not only at encouraging new and improved methods of practice, as in lead-burning and in the mechanical application of lead paints, but also at developing the application of new products such as the various lead alloys.

The new bureau will function as the distribution centre for information on lead and lead paint work. Its future publications will include such topical subjects as lead for sound vibration insulation, lead for X-ray protection, the use of lead paints in the protection of ship-building materials and in the treatment of steel-work used in large-scale building enterprises. Through its medium the Council is also to encourage the standardisation of lead products in the belief that this will help both to simplify the work of craftsmen and to widen the market for manufacturers. The address of the bureau is 19 Hobart Place, Eaton Square, London, S.W.1.

Artificial Transmutations

Chemical Society Meeting at Manchester

AFTER chemists had tried for centuries without success to transmute chemical elements, alchemy became a reality when it had passed from the laboratory of the chemists to that of the physicists who possessed methods sensitive enough to detect transmutation effected on an extremely small scale, and more powerful weapons for attacking the atoms, said Professor F. A. Paneth, Ph.D., in a lecture on "The Chemical Detection of Artificially Produced Elements," delivered to the Chemical Society at Manchester, on Tuesday. Already in the study of the spontaneous changes of the radio-elements the collaboration of chemists with physicists was essential. The discovery of polonium and radium was due to the application of the methods of "radiochemistry"; that is, ordinary methods of analytical chemistry were employed with invisible substances, and the effect controlled by electrometric apparatus.

Later chemistry was able to confirm the fact of radioactive transformation, making use of its own methods; the identification, in 1903, by Ramsay and Soddy of the gas helium as a product of the disintegration of radium, was the first purely chemical demonstration of the fact that one element had spontaneously been transformed into another.

In the study of artificial transmutation, however, for many years, from 1919 till 1934, neither radiochemical nor chemical methods could play any part. Only when, two years ago, Irene Curie and F. Joliot observed that in some cases the products of artificial transmutation decayed with the emission of radiation did radiochemical methods become applicable. This radiochemical study of artificially produced elements was, in the hands of Fermi and his collaborators, of great importance for the recognition of the nature of radioactive bodies produced by neutron bombardment. One of the most striking facts which could be established only with the help of chemists was the production of elements higher in the Periodic Table than uranium.

Quite recently it was possible to prove the artificial generation of an element by its preparation in bulk, without making use for its identification of any sort of radioactive method. By bombarding boron ester with neutrons in Professor Paneth's laboratory the ten millionth part of a c.c. of helium was produced, an amount sufficient to be separated from the ester, identified spectroscopically and measured by a special manometer.

Growing Interest in Columbite

A Windfall for Empire Tin Producers

MANY inquiries have recently been received by the Mineral Resources Department of the Imperial Institute, South Kensington, concerning the sources and the marketing of columbite. These indicate that in Great Britain and on the Continent there is a wider commercial interest in this hitherto valueless mineral, for which there is already a definite and an increasing demand.

For many years certain tin producers working alluvial and other surface deposits in Nigeria were troubled by variable amounts of the then useless mineral columbite which occurred with the tin ore and could be separated from it only with difficulty. Columbite was, moreover, an objectionable constituent from the tin smelters' point of view, and being of much the same density as tinstone it could not be removed by the hydraulic methods used for tin dressing, so that those tin-ore producers who were particularly troubled by columbite had to apply electromagnetic separators to remove it.

During the last few years research has indicated several uses for columbium, the principal being in the manufacture of stainless steel. The addition of ferro-columbium (containing 50 to 60 per cent. columbium) to certain chromium-nickel steels reduces their tendency to intergranular corrosion especially when they are exposed simultaneously to heat and chemical attack. It is also claimed that the addition of ferro-columbium renders these stainless steels more ductile. In the United States the process has reached, if not passed, the large-scale experimental stage, and, as a result, the annual consumption of columbite in that country already amounts to several hundred tons, the price for the mineral being in the neighbourhood of £70 per ton delivered.

Nigerian tin producers, who stacked their columbite as waste dumps, have now found they have retained a valuable asset, and in one instance the resultant windfall enabled a company to double its dividend. Columbite is known to occur in other parts of the Empire, and if the demand continues, the supplies from Nigeria will no doubt be augmented by material from other countries.

New Research on Optical Glass

Investigations at Mellon Institute

A BROAD programme of fundamental investigations on the chemistry and physics of glass surfaces to aid in the development of scientific apparatus and ophthalmic instruments has been started at Mellon Institute of Industrial Research by the Bausch and Lomb Optical Co., of Rochester, New York. The first studies will be concerned with the effects of environmental factors on the durability of the various types of glass used in optical instruments.

The company, whose research in optical glass dates from the initial work of William Bausch in 1912, has maintained a fellowship at Mellon Institute since 1931 for research on various plant and production problems in optical technology. New developments in the past have included improved greases for optical instruments, cements for ultra-violet transmitting optics, improved methods for making and testing mirrors and reflectors, and standardisation of the sizes of fine abrasives used in grinding lenses.

Dr. Frank L. Jones, the fellow since 1931, will be in charge of the new investigations at Mellon Institute. An enlarged staff will continue the work on plant problems at the new research laboratory of the company in Rochester. Dr. Jones received his professional education at Bucknell and Columbia.

Testing Materials

International Congress Papers

THE papers to be presented at the International Congress of the International Association for Testing Materials in London next April will be highly representative. Group A, which covers metals, comprises some 70 papers, of which Germany contributes 14, the United States and Sweden six each, France, Poland and Japan five each, and Austria and Belgium three each, while papers are also contributed from Italy, Switzerland, Czechoslovakia and Uruguay. The British contribution includes 16 papers, by various authorities, and amongst the overseas authors will be found many well-known names. The subjects included in Group A are: Behaviour of metals as dependent upon temperature (mechanical and chemical properties), progress of metallography (micro-macrography, X-ray interference, electron interference, equilibrium diagrams, non-metallic inclusions, solidification of ingots), light metals and their alloys, wear and machinability.

I.C.I. Dividends

The Converted Deferred Stock

THE £10,868,282, deferred stock of Imperial Chemical Industries, Ltd. (formerly 21,736,564 deferred shares of 10s.) now converted into £5,434,141 ordinary stock, as the result of the dismissal by the House of Lords last week of the appeal by the deferred shareholders, has already received a dividend of 4 per cent. on the reduced nominal value for 1935. A further dividend of 4 per cent., less income tax, will be paid on December 30, bringing the distribution into line with that already made to the old ordinary stockholders in respect of 1935. The holders of the new ordinary stock of £5,434,141 resulting from the conversion of the deferred stock will also receive the interim dividend of 2½ per cent actual, less income tax, in respect of the trading year ending on December 31, 1936. Holders of the former deferred stock will be advised when certificates for the new ordinary stock will be available. The company will make application to the Stock Exchanges for the quotation as from November 28 of the whole capital now consisting of preference and ordinary stock in units of £1.

Chemical Matters in Parliament

Gas Masks

IN the House of Commons on November 20, Mr. T. Morris (Cardiff) asked the Home Secretary when the bulk issue of gas masks for the public would commence; whether the pattern had been finally settled; and what was the estimated cost and life of these masks.

Mr. G. W. Lloyd, Under Secretary, in reply, said that apart from issues for instructional purposes, it was not proposed that the respirators which were to be made for the civil population should be issued until the need for their use arose. The design of these respirators had been settled and mass production was about to commence. It was not yet possible to give an exact figure for the cost of the respirators, nor to estimate their life, though arrangements to facilitate long period storage were being made.

Zinc Smelting

On Monday, Mr. Smedley Crooke (Deritend) asked the President of the Board of Trade if he was aware that the Imperial Smelting Corporation would be compelled to close its zinc section at Bloxwich following the recent closing at Seaton Carew, which was in a distressed area.

Dr. Burgin, in reply, said that the Government was most anxious to take whatever steps were possible to prevent the closing of industries in the Special Areas or elsewhere.

Progress in Fuel Research

Cheaper Carbon for Gas Masks

THE annual report of the Fuel Research Board for the year ended March 31, 1936, published on Wednesday, records that at the request of the War Office, the Board has produced from British coal an active carbon for use in gas masks which is considerably cheaper and nearly, if not quite, as good as the best obtainable from other sources. The active carbon was obtained by carbonising certain hard coal at low temperatures, and then activating it by steam at high temperatures.

Investigations into the production of gas from cannel coal, a shaly material associated with coal seams in Scotland, showed that gas could be obtained at a cost of less than halfpenny per therm. In addition, the 22,000 tons of cannel treated produced as much as from 40 to 50 gal. of tar per ton. This tar, unlike vertical retort tar from bituminous coal, was as amenable for the production of motor spirit by hydrogenation as low temperature tar. An early study of other cannel is urged, but it is pointed out that as this type of coal occurs in a sporadic manner it cannot form a source of material upon which reliance can be placed for any length of time.

Dealing with the conversion of tar into motor spirit, the report states that the engineering difficulties and those of temperature have been overcome, and experience has been gained which would enable a simple large-scale plant to be designed.

Experiments on the production of a first-class lubricating oil from coal have been unsuccessful so far. The most hopeful line of attack is the use of oils obtained by synthesis from carbon-monoxide and hydrogen, and a plant is being erected to produce sufficient material for further experiments.

Industrial Alcohol in Ireland

Anticipated Output of 1,500,000 Gal. per Year

THE new Irish Free State industrial alcohol factory at Cooley, County Louth, will accept its first delivery of potatoes on December 15. Some time ago an industrial alcohol section was formed by the Government with a view to producing a high-grade spirit suitable for blending with petrol, of which some forty million gal. are consumed yearly in the Free State. The section has now completed its initial labours and in future will be known by the official designation of Saorstat Alcohol Factories, Ministry of Industry and Commerce, with headquarters at 81 Merrion Square, Dublin. The new enterprise is under the directorship of Mynheer S.A.A. Maas, of Holland, who has erected and controlled alcohol factories in many parts of Europe; its biochemical branch is headed by Mynheer Rietveld, also of Holland, and its commercial activities are directed by Mr. E. F. O'Riordan, of the Department of Industry and Commerce. An advisory board, headed by Professor T. Nolan, of University College, Dublin, supervises and advises.

From January 1, Irish-made alcohol will be available in increasing quantities, first from the Cooley factory and later from the four other factories now nearing completion. All five factories are of the same type and have the same capacity. In 1937, accordingly as they come into production, each factory will produce 1,000 gal. of industrial alcohol per day. When all five are working together the total annual output in round figures will be 1,500,000 gal. Although the actual number of employees in each factory will be small (30 to 35 men in all-the-year-round jobs), the ultimate effect which the factories will have on unemployment is expected to be considerable.

The technical experts who have examined almost every variety of known potato are satisfied with the starch-content and the general suitability of the several types of potato grown in Ireland. It is known, however, that they especially favour four or five already popular varieties, and it is probable that when the factories are in full production the growers will be asked, where possible, to plant such tubers.

Personal Notes

MR. FRANK E. TURNER, of Wheatley, Hallifax, director and manager of the Wheatley branch of Yorkshire Indigo, Scarlet, and Colour Dyers, Ltd., left estate valued £6,298, with net personalty £6,185.

LORD FALMOUTH has been appointed a member of the Advisory Council to the committee of the Privy Council for Scientific and Industrial Research. Professor A. C. G. Egerton has retired from the council on completion of his term of office.

MR. JAMES SCOTT, Mr. John Scott, and Mr. Peter Wilson have retired from the soap works of the Scottish Wholesale Co-operative Society at Grangemouth after 21, 18 and 17 years' service respectively, and have been presented with gifts from the staff and employees.

MR. IVON A. BAILEY has been appointed general manager of the Clydach refinery of the Mond Nickel Co., Ltd. For the past five years, Mr. Bailey has been general manager of the works of Henry Wiggin and Co., Ltd., Birmingham, a subsidiary of the Mond Nickel Co.

PROFESSOR I. M. HEILBRON will deliver the annual Hurter Memorial Lecture of the Liverpool Section of the Society of Chemical Industry in the Chemistry Lecture Theatre, Liverpool University, next Friday. His subject will be "Modern Technique in Biochemistry."

MR. A. NORMAN HARRIS, of the laboratory staff of Lennon, Ltd., manufacturing chemists, Port Elizabeth, has been elected Mayor of Walmer, South Africa, for the third year in succession.

MR. H. JACOBSON and MR. L. JACOBSON, two of the partners of the Peerlees Supply Co., chemical manufacturers, Glasgow, have retired. The two remaining partners, Mr. A. Hodgert and Mr. R. M. Hodgert, will carry on the business on their own account and under the same firm name.

DR. G. A. OTTO SCHACK-SOMMER, Victoria Street, London, a founder of the sugar factory and refinery of Martineaus, Ltd., of which concern he was chairman for 30 years, formerly manager of Crosfield, Barrow and Co., of Liverpool, and who claimed to be the instigator of the British beet sugar industry, left estate valued £102,195, with net personalty £100,841.

MR. J. DAVIDSON PRATT, general manager and secretary of the Association of British Chemical Manufacturers, who is an authority on chemical warfare and the measures now being taken for the protection of this country against hostile air attack, will speak to the members of the Pharmaceutical Society on "The Defence of the Civil Population Against Gas" at a meeting at University College at 8.30 p.m. next Tuesday.

Chemical Notes from Foreign Sources

Bulgaria

PYRETHRUM CULTIVATION on an extensive scale is planned by a State subsidised co-operative concern at Varna. The area under cultivation this year is only 130 hectares.

Finland

IN ADDITION TO THE NEW CHLORINE FACTORY, which is to be built by Imperial Chemical Industries, in Aetsae, a further chlorine factory is already under construction at Enso by financial assistance of Enso-Gutzeit. This factory is being built at a cost of 20 million Finnish marks. It will consume 22,000 kilos of mercury and 3,500 tons of salt annually. The output will be 2,000 tons of chlorine.

Jugoslavia

CONSTRUCTON OF A PETROLEUM REFINERY is being planned by the firm of Ipoil, at Osijek, with the support of the Astra Co., of Agram and Belgrade, and the Rumanian petroleum concern, Unirea.

THE ZORKA COMPANY FOR CHEMICAL INDUSTRY, of Subotica, achieved a gross profit in 1935 of 10.47 million dinars and a net profit of 1.3 million dinars. The general meeting to be held at the end of this month will consider transfer of the headquarters to Schabatz where it is proposed to erect a factory for the manufacture of acids, fertilisers and copper sulphate.

ETHYL ACETATE CAN BE FORMED CATALYTICALLY from ethyl alcohol in the absence of mineral acids and at a relatively low temperature by passage over a catalyst composed of 99.5 per cent. copper and 0.2 per cent. cerium. This catalyst is prepared, according to Dolgov, Koton and Leczomk, by alkali precipitation of copper acetate or nitrate solution, followed after washing and drying by reduction with hydrogen at 200° C. Optimum conditions for ethyl acetate formation are a temperature of 275° C. and an ethyl alcohol flow over the catalyst of 15 c.c. per second, when a 33.7 per cent. yield is got after a single passage over the catalyst ("Chimie et Industrie," October, 1936).

Estonia

AT THE INSTIGATION OF THE MINISTRY OF THE INTERIOR, a Federation of Estonian chemical industrialists has been formed. Its task is to unite all manufacturers of chemicals for the common defence of their business interests.

Japan

ETHYL AND BUTYL ACETATE MANUFACTURE is to be undertaken by Showa Gosei Kagaku Kogyo K.K. (Showa Synthetic Chemical Industry Co.).

A SPECIAL RESEARCH LABORATORY for investigations on artificial wool is to be established in the Royal University of Kyota, for which purpose a grant of 200,000 yen has been made.

Russia

INTERESTING DERIVATIVES OF DECANAPHTHENIC ACID have been recently isolated by A. Oskesks. The hydrazide, a transparent resin melting at 29° C., is readily soluble in common organic solvent, but almost insoluble in water. The azide is a mobile liquid, readily decomposing with liberation of nitrogen. It can be converted into the isocyanate, a thick liquid with a disagreeable odour; and a urethane, a mobile liquid with a somewhat fruity odour ("Chimie et Industrie," Paris, October, 1936).

Germany

PRODUCTION AND SALE OF SULPHUR is to be controlled in Germany by the newly formed Schwefel G.m.b.H., of Frankfurt-on-Main, which has a nominal capital of 50,000 marks and numbers among its members the I. G. Farbenindustrie, Ruhrgas A.-G., Braunkohle-Benzin A.-G., Kali-Chemie A.-G., as well as several gasworks producing sulphur. The marked increase in German production of sulphur in recent years has resulted in a large measure of independence of foreign supplies and the new organisation will still further encourage this tendency.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Open to Public Inspection

PROCESS FOR THE DYEING OF CELLULOSE TEXTILES.—I. G. Farbenindustrie. May 9, 1935. 12928/36.

PROCESS OF MAKING WETTING AGENTS, emulsifying agents, softening agents and textile assistants.—I. G. Farbenindustrie. May 8, 1935. 13052/36.

PROCESS FOR DISINFECTING AND PRESERVING.—Chemische Fabrik von Heyden, A.-G. May 9, 1935. 13275/36.

MANUFACTURE OF DYES AND PROCESS FOR SENSITISING PHOTOGRAPHIC SILVER HALIDE EMULSIONS.—N. V. Gevaert Photo-Producten. May 9, 1935. 13278/36.

PROCESS FOR OBTAINING 1.1.2 TRICHLORETHANE.—Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges, et Camargue. May 6, 1935. 10709/36.

METHOD OF PREPARING (1-PHENYL-2, 3-DIMETHYL-5-PYRAZOLONYL)-ISOPENTYL KETONE.—H. P. Kaufmann. May 7, 1935. 11103/36.

PROCESS FOR THE MANUFACTURING OF INSECTICIDES or fungicides. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. May 8, 1935. 11433/36.

PARASITICIDES and methods of using the same.—Clorox Chemical Co. May 6, 1935. 12349/36.

METHOD OF PRODUCING THERAPEUTICALLY AND DISINFECTANTLY ACTIVE SUBSTANCES.—Syngala Fabrik Für Chemischsynthetische und Galenische Arzneimittel Ges., and F. Feigl. May 3, 1935. 12517/36.

Specifications Accepted with Date of Application

ABSORPTION IN HIGHLY-CONCENTRATED NITRIC ACID of nitrous gases formed by the combustion of ammonia.—Bamag-Meguin, A.-G. January 19, 1935. 455,734.

METHODS AND PLANTS for the purification of gases from tar and for the recovery of the dehydrated tar.—Soc. Pour L'Exploitation des Procedes Ab-Der-Halden. February 19, 1935. 455,754.

METHOD OF SEPARATING HETEROGENOUS MIXTURES.—C. E. Wuensch. April 23, 1935. 455,888-9.

PIGMENTS AND FILM-FORMING COMPOSITIONS containing the same.—H. A. Gardner. May 23, 1934. 455,762.

MERCERISATION OF VEGETABLE FIBRES.—I. G. Farbenindustrie. April 11, 1935. 455,893.

ELECTROLYTIC PREPARATION OF ALLOYS of the alkaline earth metals.—Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges, et Camargue. May 27, 1935. 455,894.

PROCESS FOR MAKING WHITE CLOUDED ENAMEL.—Dr. I. Kreidl. September 25, 1935. 455,771.

PROCESS FOR SULPHURISING FATTY OIL.—K. W. Posnansky and C. Sandvoss (trading as Dr. Alexander and Posnansky.) March 26, 1934. 455,779.

CONVERSION UNDER PRESSURE AND IN LIQUID PHASE of hydrocarbons having high boiling-points into hydrocarbons having lower boiling-points.—P. Guichard. Feb. 2, 1934. 456,089.

FORMING OF TITANIUM PRODUCTS.—A. H. Stevens (C. F. Burgess Laboratories, Inc.). March 2, 1935. 456,058.

MANUFACTURE OF AQUEOUS SOLUTIONS of addition compounds of alkyl-acridinium salts with heavy metal salts.—W. W. Groves (I. G. Farbenindustrie). March 27, 1935. 456,060.

MANUFACTURE OF ARTIFICIAL THREADS or the like.—W. W. Groves and I. G. Farbenindustrie. March 28, 1935. 456,061.

BETA-CHLOROETHYL BETA-CHLOROETHOXY-ETHYL ETHER.—Carbide and Carbon Chemicals Corporation. April 17, 1934. 456,278.

SEPARATION OF THE ACYLATABLE CONSTITUENTS of a substance mixture.—Schering-Kahlbaum, A.-G. April 6, 1934. 456,210.

MANUFACTURE AND PRODUCTION OF HALOGEN ALKYLAMINES or their salts.—Coutts and Co., and F. Johnson (Legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie). May 3, 1935. 456,338.

MANUFACTURE OF BISMUTH SALTS.—I. G. Farbenindustrie. May 4, 1934. 456,341.

ASSISTANTS FOR USE IN THE TEXTILE, leather, paper, and like industries.—I. G. Farbenindustrie. May 4, 1934. 456,142.

PROCESS FOR THE MANUFACTURE OF WATER-INSOLUBLE AZO DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie). May 3, 1935. 456,343.

MEAT-CURING SUBSTANCES.—Griffith Laboratories, Inc. October 30, 1934. 455,823..

ADHERENT GREASES and method for manufacturing the same.—Standard Oil Development Co. March 14, 1935. 455,735.

GLASSES RESISTANT TO ALKALI METAL VAPOURS and method of making them.—Corning Glass Works. November 6, 1934. 455,945.

POLYMERISATION OF UNSATURATED ORGANIC COMPOUNDS.—Röhm and Haas, A.-G. December 31, 1934. 455,742.

PREPARATION OF PURIFIED ALCOHOL from worts.—Usines de

PROCESS FOR THE MANUFACTURE OF CHRYSENE MONOSULPHONIC ACID.—I. G. Farbenindustrie. May 4, 1934. 455,991.

PROCESSES FOR DE-SIZING.—Kalle and Co., A.-G. June 20, 1935. (Addition to 428,827.) 455,804.

PROCESS FOR PRODUCING RESISTS IN DYEING with ester salts of leuco vat-dyestuffs.—Durand and Huguenin, A.-G. August 6, 1934. 455,872.

METHOD OF FORMING A MEAT-CURING SALT PRODUCT.—Griffith Laboratories, Inc. November 7, 1934. 455,816.

MANUFACTURE OF ALGINATES.—A. H. Gruart. May 5, 1934. 456,342.

PURIFICATION OF LIME ALUMINATES.—J. C. Seailles. May 12, 1934. 456,287.

CRACKING OF MINERAL OILS.—Standard Oil Development Co. February 21, 1935. 456,244.

PROCESS FOR PURIFYING FINELY DIVIDED CARBON BLACK which has been formed on iron-containing contacts by decomposition of carbon monoxide.—Bayerische Stickstoff-Werke, A.-G. February 28, 1935. 456,252.

PROCESS FOR MANUFACTURING CARAMEL and product made thereby. F. Sornet, A. Kopka, and Chocolat-Magniez-Baussart. March 28, 1935. 456,266.

PURIFICATION OF TITANIUM COMPOUNDS.—A. H. Stevens (C. F. Burgess Laboratories, Inc.). March 2, 1935. 456,314.

POLYMERISATION OF OLEFINES.—Standard Alcohol Co. June 13, 1935. 456,315.

Applications for Patents

(November 5 to 11 inclusive.)

MANUFACTURE OF ARTIFICIAL LEATHER.—International Latex Processes, Ltd. (Italy, Dec. 3, '35.) 29636.

MANUFACTURE, ETC. OF PLASTIC MASSES.—G. W. Johnson (I. G. Farbenindustrie.) 29753.

MANUFACTURE, ETC. OF UNSATURATED COMPOUNDS.—G. W. Johnson. 30017.

PRODUCTION, ETC. OF SUBSTANCES in a radio-active condition.—S. Klinghoffer. (France, Oct. 30, '35.) 29442.

SINTERED HARD METAL ALLOYS.—F. Krupp, A.-G. (Germany, Dec. 2, '35.) 29801.

PHENOL-FORMALDEHYDE CONDENSATION PRODUCTS.—R. A. C. Kuenzli. 29829.

LUMINESCENT MATERIALS.—L. A. Levy and D. W. West. 29433.

PREPARATION OF AN ALUMINIUM OXIDE LAYER.—V. Lichoff. 29409.

PRODUCTION OF METHYLOLUREA.—N. Lubicz. 29812.

EXTRACTION OF DUST, ETC. from gaseous fluids.—I. S. Mackenzie. 29723.

PROCESS, ETC. FOR TREATING GASES.—C. Marischka. (Austria, Nov. 4, '35.) 29940.

APPARATUS FOR REGENERATING USED LUBRICATING OIL, ETC.—S. Bramley-Moore. 30043.

PHENOL-FORMALDEHYDE CONDENSATION PRODUCTS.—Permastic, Ltd., and G. E. Mountney. 29829.

MANUFACTURE OF CUPRIFEROUS ZEOLITIC FUNGICIDES.—Permutit Co. (United States, Nov. 19, '35.) 29786.

MANUFACTURE OF LAEVO-ASCORBIC ACID.—T. Reichstein. (Switzerland, Nov. 26, '35.) 29886.

PROCESS FOR COLLECTING MOISTURE in atmosphere by condensation.—G. Rietti. 29584.

PROCESS FOR THE PURIFYING OF USED MERCERISING LYES.—R. Russischwili. 29968.

BLEACHING OF VEGETABLE FIBRES.—R. Russischwili. 29969.

MANUFACTURE OF FOLLICLE HORMONE, ETC. COMPOUNDS.—Schering-Kahlbaum, A.-G. (Germany, Nov. 5, '35.) 29454.

POLYMERISATION OF OLEFINES.—Standard Oil Development Co. (United States, Dec. 30, '35.) 29687.

MANUFACTURE OF ARYLENE HYDROCARBONS, ETC.—H. M. Stanley Distillers Co., Ltd., and G. Minkoff. 29599.

MANUFACTURE OF ADHESIVES.—W. J. Tennant (Spier). 29592.

PRODUCTION OF REFRACTORIES from chrome ore, etc.—A. Williams and C. P. Williams. 29695.

VULCANISATION OF RUBBER.—Wingfoot Corporation. (United States, June 30.) 30001.

TREATMENT OF LATEX.—Wingfoot Corporation. (United States, July 6.) 30002.

COOLING GASEOUS PRODUCTS OF DISTILLATION.—A. V. Abbishaw. 30599.

MANUFACTURE OF AMMONIUM SULPHATE.—Imperial Chemical Industries, Ltd., M. P. Applebey, and J. W. R. Rayner. 30825.

MANUFACTURE OF LUBRICANTS.—F. P. Bowden. 30200.

MANUFACTURE, ETC., OF CELLULOSE DERIVATIVES.—British Celanese, Ltd. (United States, Nov. 13, '35.) 30778.

MAKING OF POLYVINYL ACETAL RESINS.—Carbide and Carbon Chemicals Corporation. (United tSates, Dec. 14, '35.) 30756.

MANUFACTURE OF AZO DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie). 30170.

LIME-ZEOLITE WATER-SOFTENING PROCESSES.—J. Crosfield and Sons, Ltd., R. Furness and H. J. Wheaton.

Forthcoming Events

LONDON.

Dec. 1.—British Launderers' Research Association. Opening of Extensions to Laboratories, Hendon, by Sir William Bragg. 3 p.m. (Luncheon, Brent Bridge Hotel, 1 p.m.).

Dec. 1.—Royal Institution. "Chemical Messengers of the Body." Professor E. Mellanby. 5.15 p.m. 21 Albemarle Street, London.

Dec. 1.—Pharmaceutical Society of Great Britain. "The Defence of the Civil Population against Gas." J. Davidson Pratt. 8.30 p.m. The Great Hall, University College, London.

Dec. 2.—Institute of Metals. (London Local Section). London Branch of the Institute of British Foundrymen. "Some Impressions of Industry in the U.S.S.R." W. T. Griffiths. 7.30 p.m. Rooms of the Society of Motor Manufacturers and Traders, Ltd., 83 Pall Mall, London.

Dec. 2.—Society of Public Analysts. "The Detection of Arachis Oil in Olive Oil." Norman Evers. "The Enzymes of Milk. 1. Notes on Kay and Graham's Phosphates Test." E. B. Anderson, Z. Herschdorfer and F. K. Neave. "The Determination of Cyanide in Aqueous Extracts of Road Tars." W. G. Moffit and E. H. Williams. "A Rapid Method for the Determination of Triethanolamine." C. J. Eastland, Norman Evers and T. J. West. 8 p.m. Chemical Society's Rooms, Burlington House, Piccadilly, London.

Dec. 3.—Institute of Fuel. Informal Meeting. "Steam versus Internal Combustion Engines for Road Vehicles." M. Harman Lewis and Maurice Platt. 6.30 for 7 p.m. British Industries House, Marble Arch, London.

Dec. 3.—Chemical Society. "A Review of Recent Work on Highly Unsaturated Acids." Dr. E. H. Farmer. "Retention of Asymmetry and Inversion of Configuration during Anionotropic Change. The Conversion of (-)a-phenyl-γ-methyllyl alcohol into (+)γ-phenyl-a-methylallyl alcohol. Dr. J. Kenyon, S. M. Partridge and Dr. H. Phillips. "The Azo-group as a Chelating Group. Part II. The Structure of the Diazoamino Compounds." Dr. L. Hunter. 8 p.m. Burlington House, Piccadilly, London.

BIRMINGHAM.

Dec. 1.—Electrodepositors' Technical Society. (Midlands Centre). "Modern Plating Shop Practice." W. J. Riley. 7.30 p.m. James Watt Memorial Institute, Gt. Charles Street, Birmingham.

Dec. 3.—Institute of Metals. (Birmingham Local Section). "Some Aspects of Industrial Hygiene." Howard E. Collier. 7 p.m. James Watt Memorial Institute, Birmingham.

Dec. 3.—Institute of Vitreous Enamellers. (Midland Section). "Lighting Equipment for Vitreous Enamelling Plants." H. H. Long. 7.30 p.m. Chamber of Commerce, New Street, Birmingham.

BRISTOL.

Dec. 3.—Society of Chemical Industry. (Bristol Section) and Group). Joint meeting with Bristol Section. "Some Alloy Cast Irons of Interest in Chemical Engineering." Dr. L. B. Pfeil. 6.30 p.m. Chemical Department, The University, Bristol.

GLASGOW.

Dec. 4.—Chemical Society. (Glasgow Section). Ramsay Chemical Dinner. Professor G. G. Henderson in the chair. 7 p.m. Central Station Hotel, Glasgow.

HULL.

Dec. 1.—Hull Chemical and Engineering Society. "Cellulose Esters, with particular reference to Cellulose Acetate." Dr. Ing. H. P. Staudinger. 7.45 p.m. Hull Photographic Society's Room, Grey Street, Park Street, Hull.

LIVERPOOL.

Dec. 4.—Society of Chemical Industry. (Liverpool Section). Hurter Memorial Lecture. "Modern Technique in Bio-Chemistry." Professor I. M. Heilbron. 6 p.m. Department of Chemistry, The University, Liverpool.

MANCHESTER.

Dec. 2.—Manchester Metallurgical Society. "Modern Welding." W. Andrews. 7 p.m. Constitutional Club, St. Ann's Street, Manchester.

Dec. 3.—Institute of Chemistry. (Manchester Section). Annual Dinner and Dance. "The Manchester," Ltd., Manchester.

Dec. 3.—Institute of Vitreous Enamellers. (Northern Section). "Millroom Practice." B. B. Kent. 7.30 p.m. Queen's Hotel, Manchester.

Dec. 4.—Society of Chemical Industry. "Recent Advances in Water Softening and Boiler Feed Water Conditioning." P. Hamer. Constitutional Club, St. Ann's Street, Manchester.

NOTTINGHAM

Dec. 2.—Society of Dyers and Colourists. (Midlands Section). "Slubbing Dyeing" (illustrated with a short film). Edgar Isles. University College, Nottingham.

SHEFFIELD.

Dec. 4.—Chemical Society. (Sheffield Section). "Molecular Structure of Strychnine." Professor R. Robinson. 5.30 p.m. Chemistry Lecture Theatre, The University, Sheffield.

Chemical and Allied Stocks and Shares

SENTIMENT in the stock and share markets has been affected by the latest developments in the European political situation, and many active industrial shares which had recently risen strongly in price have shown a partial reaction. Selling pressure was not heavy, and subsequently the lower prices attracted buyers. Shares of chemical and allied companies held up relatively well, but the tendency was to lower prices in view of general market conditions. Imperial Chemical at 43s. have lost 1s. as compared with a week ago and the deferred shares were also lower. The general assumption in the market is that the ordinary dividend will be maintained at 8 per cent. B. Laporte have come in for increased attention on the belief that either an increased dividend or another bonus can be anticipated, and the price is higher on the week at 131s. 3d. Distillers are 117s. 6d., against 118s. 3d. a week ago.

Boots Pure Drug were steady at 56s. 1½d. and Timothy Whites and Taylors at 35s. 9d. have held most of their recent rise. British Drug Houses were more active and have been maintained at 21s. 3d. at the time of writing. British Glues remained at 9s. 9d. Salt Union were again steady at 41s. 3d.

Blythe Colour Works were in request around 11s. 9d. aided by the favourable estimates of the dividend now current. William Blythe 3s. ordinary shares were firm around 7s. 9d., and the list price for A. Boake Roberts ordinary shares remained at 40s. United Molasses were bought on the increased dividend and profits for the past year. The market is taking the view that a further good upward movement in profits is probable for the current financial year and that as time proceeds they may return to around the £1,000,000 level which ruled prior to the depression. The yield on the shares is small, but this has to be read in relation to the belief that dividends may rise considerably during the next few years.

Richard Thomas continued an active feature and are 16s. 7½d. at the time of writing. The market is anticipating that the company may propose a debenture conversion operation before long. Consett Iron were lower on balance, but recovered part of a reaction shown earlier in the week. Owing to the reduced capital arising from the reorganisation and the assumption that the upward movement in profit is being continued, there are continued expectations current in the market that the company will be able to resume dividends with a favourable payment. On the basis of last year's profits, earnings on the present ordinary shares would work out at about 15 per cent. Dorman Long continued active on anticipations that the full report will show the recently declared dividend to be a very conservative payment. The belief is gaining ground in the market that most of the leading iron and steel companies will probably follow a conservative dividend policy in view of the large expenditure necessitated by the big factory and works extensions in hand. United Steel were little changed at around 31s. 3d. Although the capital of the latter company has been considerably increased, at least the maintenance of the dividend is generally anticipted, as it is realised that the productive capacity of the group has been considerably increased and that profits should benefit as a result.

International Combustion held up well on continued expectations of an increased distribution and Cannon Iron Foundries were steady for a similar reason. Paint shares were less in evidence and Pinchin Johnson lost part of their recent rise. International Nickel were active in common with most shares which are influenced by New York market conditions, but the demand for the shares is based on the belief that the upward movement in profits and quarterly dividends is likely to be continued, having regard to the increasing demand for nickel. Calico Printers, Bradford Dyers and most other leading cotton textile shares have been active, but best prices were not held. Oil shares made lower prices, sentiment having been affected by the decision to postpone the decision as to an interim dividend on "Shell" ordinary shares.

Weekly Prices of British Chemical Products

THERE are no price changes to report in the London chemical markets this week. Unless otherwise stated the prices below cover fair quantities net and naked at sellers' works.

MANCHESTER.—A seasonal awakening of interest in forward contracts has been reported on the Manchester chemical market during the past week, and a moderate amount of business has been booked. Activity in this respect may be expected to grow and sellers on this centre are not anticipating any falling away in the aggregate volume of contract buying compared with a year ago. Apart from this, a certain amount of business has been transacted for prompt or near delivery. In the meantime, the movement of supplies of the heavy acids and of the leading potash and soda products into consumption against contracts has been on fairly active lines and the general position in this respect so far as Lancashire and the West Yorkshire areas are concerned is not unsatisfactory. The demand for pitch continues relatively slow, but in most other directions a steady trade is being done.

GLASGOW.—There has been a steady day to day demand for chemicals for home trade during the week, but export business has been limited. Prices generally continue very firm at about previous figures. Lead, copper and zinc products especially are strong, in sympathy with the advancing metal prices, and red lead is £1 per ton dearer. In the coal tar products group there have been no noteworthy alterations in market conditions. Prices generally are very steady, although the number of fresh transactions is limited. Pale cresylic acid 99/100 is in demand wherever available, and considerable quantities of dark 97/99 continue to move both for home and export. The price of crude naphthalene in this district is now under £7 10s. per ton in sellers' bags. Benzol, toluol and xylol are rather quiet; naphthas are about normal; lighter pyridine fractions continue to command the higher figures of last report. Some minor forward contracts for home pitch supplies have been booked, but on the export side this product remains rather dull.

General Chemicals

ACETONE.—£62 to £65 per ton; SCOTLAND: £64 to £65 ex wharf, according to quantity.

ACID, ACETIC.—Tech., 80%, £30 5s. to £32 5s. per ton; pure 80%, £32 5s. to £34 5s.; tech., 40%, £16 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £32 5s.; tech., 80%, £30 5s., d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ACID, BORIC.—Commercial granulated, £27 per ton; crystal, £28; powdered, £29; extra finely powdered, £31; packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. B.P. cryst., £36; B.P. powder, £37. SCOTLAND: Crystals, in 1 cwt. bags, £28; powdered, in 1 cwt. bags, £29.

ACID, CHROMIC.—9¼d. per lb., less 2½%; d/d U.K.

ACID, CITRIC.—1s. per lb. MANCHESTER: 11¾d. to 1s. SCOTLAND: B.P. crystals, 1s. per lb., less 5%.

ACID, CRESYLIC.—97/99%, 3s. 2d. to 3s. 3d. per gal.; pale, 98%, 3s. 1d. to 3s. 2d.; dark, 2s. 6d. to 2s. 7d.; 99/100%, refined, 3s. 7d. to 3s. 9d. per gal. MANCHESTER: 99/100%, pale, 3s. 6d.

ACID, FORMIC.—85%, in carboys, ton lots, £42 to £47 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50: pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works. SCOTLAND: 80°, £24 ex station full truck loads.

ACID, OXALIC.—£48 15s. to £57 10s. per ton, according to packages and position. SCOTLAND: £2 9s. 6d. per cwt. in casks. MANCHESTER: £49 to £54 10s. per ton ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. SCOTLAND: 11¾d. less 5%. MANCHESTER: 1s. per lb.

ALUM.—SCOTLAND: Ground, £10 2s. 6d. per ton; lump, £9 12s. 6d.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19 (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM SULPHATE.—Neutral quality, 20.6% nitrogen, £6 19s. per ton.

ANTIMONY OXIDE.—SCOTLAND: £61 to £65 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 1d. per lb.; crimson, 1s. 5½d. to 1s. 7d. per lb., according to quality.

ARSENIC.—LONDON: £13 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £17 ex store. MANCHESTER: White powdered Cornish £17 10s. ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BARYTES.—£6 to £7 10s. per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.a. London.

BLEACHING POWDER.—Spot, 35/37%. £7 19s. per ton in casks, special terms for contracts. SCOTLAND: £9.

BORAX COMMERCIAL.—Granulated, £14 10s. per ton; crystal £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots. SCOTLAND: Granulated, £14 10s. per ton in 1 cwt. bags, carriage paid.

CADMIUM SULPHIDE.—4s. 1d. to 4s. 3d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums. SCOTLAND: 70/75% solid, £5 10s. per ton net ex store.

CARBON BISULPHIDE.—£31 to £33 per ton, drums extra.

CARBON BLACK.—3¾d. to 4¾d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 2⅜d. per lb.; liquor, £19 10s. per ton d/d

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works

CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. LONDON: £3 17s. per cwt. SCOTLAND: £3 19s. 6d. net.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £24 10s. per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resublimed B.P., 5s. 1d. per lb.

LAMPBLACK.—£23 to £24 per ton.

LEAD ACETATE.—LONDON: White, £33 15s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £35; brown, £1 per ton less. MANCHESTER: White, £35, brown, £34.

LEAD NITRATE.—£32 10s. to £34 10s. per ton.

LEAD, RED.—SCOTLAND: £35 per ton less 2½%, carriage paid, for 2-ton lots.

LEAD, WHITE.—SCOTLAND: £40 per ton, carriage paid. LONDON: £41.

LITHOPONE.—30%, £16 to £16 5s. per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store

MAGNESIUM CHLORIDE.—SCOTLAND: £7 per ton.

MAGNESIUM SULPHATE.—Commercial, £5 per ton, ex wharf.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

PARAFFIN WAX.—SCOTLAND: 3⅝d. per lb.

PHENOL.—6¾d. to 7½d. per lb.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £39

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 4¼d. per lb. MANCHESTER: £38 10s. per ton.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM IODIDE.—B.P. 4s. 3d. per lb.

POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8¼d. per lb. SCOTLAND: B.P. Crystals, 8¼d. MANCHESTER: B.P. 10½d. to 11½d.

POTASSIUM PRUSSIATE.—LONDON: Yellow, 7½d. to 8d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 6¾d.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels. SCOTLAND: Large crystals, in casks, £36.

SODA ASH.—58% spot, £5 12s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 12s. 6d. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—LONDON: £21 per ton. SCOTLAND: £17 15s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: £12 10s. per ton in 1 cwt. kegs, £10 15s. per ton in 2 cwt. bags. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount 5%. Anhydrous, 5d. per lb. LONDON: 4d. per lb. less 5% for spot lots and 4d. per lb. with discounts for contract quantities. MANCHESTER: 4d. per lb. SCOTLAND: 4d., less 5% carriage paid.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE, MONOHYDRATE.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags. Soda crystals, SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality, 7s. 6d. per ton extra. Light Soda Ash, £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£29 per ton. SCOTLAND: £1 10s. per cwt.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10; photographic, £14 10s.

SODIUM IODIDE.—B.P., 6s. per lb.

SODIUM METASILICATE.—£14 per ton, d/d U.K. in cwt. bags.

SODIUM NITRITE.—LONDON: Spot, £18 5s. to £20 5s. per ton d/d station in drums.

SODIUM PERBORATE.—10%, 9½d. per lb. d/d in 1-cwt. drums. LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£13 per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4¼d. to 4½d.

SODIUM SILICATE.—140° Tw. Spot, £8 per ton. SCOTLAND: £8 10s.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material, £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d. to £3 5s.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 7s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid, 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.

SODIUM SULPHITE.—Pea crystals, spot, £13 5s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £17 per ton f.o.b. SCOTLAND: £17 15s. per ton less 5%.

SULPHUR.—£9 to £9 5s. per ton. SCOTLAND: £8 to £9.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Neutral quality, basis 20.6 per cent. nitrogen, delivered in 6-ton lots to farmer's nearest station, November, £6 19s. per ton; December, £7 0s. 6d. per ton; January, 1937, £7 2s. per ton; February, 27 3s. 6d. per ton; March to June, £7 5s. per ton.

CALCIUM CYANAMIDE.—November, £6 18s. 9d. per ton; December, £7 per ton; January, 1937, £7 1s. 3d. per ton; February, £7 3s. 6d. per ton; March, £7 3s. 9d. per ton; April to June, £7 5s. per ton, carriage paid to any railway station in Great Britain in lots of four tons and over.

NITRO-CHALK.—£7 5s. per ton for delivery to end of June, 1937.

NITRATE OF SODA.—£7 12s. 6d. per ton for delivery up to end of June, 1937.

CONCENTRATED COMPLETE FERTILISERS.—£10 12s. to £11 1s. per ton for delivery up to end of June, 1937, delivered in 6-ton lots to farmer's nearest station.

AMMONIUM PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton for delivery up to end of June, 1937, delivered in 6-ton lots to farmer's nearest station.

Coal Tar Products

ACID, CRESYLIC.—97/99%, 3s. 2d. to 3s. 3d. per gal.; 99/100%, 3s. 6d. to 4s. per gal., according to specification; pale 99%, 3s. 4d. to 3s. 5d.; dark, 2s. 9d. to 2s. 10d. GLASGOW: Pale, 99/100%, 3s. to 3s. 6d. per gal.; pale, 97/99%, 2s. 6d. to 2s. 9d.; dark, 97/99%, 2s. 5d. to 2s. 8d.; high boiling acids, 1s. 8d. to 2s.; American specification, 2s. 9d. to 3s.

ACID, CARBOLIC.—Crystals, 6¾d. to 7¼d. per lb.; crude, 60's, 2s. 7d. to 2s. 9d. per gal. MANCHESTER: Crystals, 6¾d. to 7d. per lb.; crude, 2s. 8d. per gal. GLASGOW: Crude, 60's, 2s. 6d. to 2s. 9d. per gal.; distilled, 60's, 2s. 9d. to 3s. 3d.

BENZOL.—At works, crude, 8½d. to 9d. per gal.; standard motor 1s. 2d. to 1s. 2½d.; 90%, 1s. 3d. to 1s. 3½d.; pure, 1s. 7d. to 1s. 7½d. LONDON: Motor, 1s. 3½d. GLASGOW: Crude, 9d. to 10d. per gal.; motor, 1s. 2d. to 1s. 3d.

CREOSOTE.—B.S.I. Specification standard, 5¾d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 4½d. f.o.r. North: 5d. London. MANCHESTER: 4¾d. to 5½d. GLASGOW: B.S.I. Specification 5d. to 5½d. per gal.; washed oil, 4½d. to 4¾d.; lower sp. gr. oils, 4¾d. to 5d.

NAPHTHA.—Solvent, 90/160%, 1s. 5½d. to 1s. 6½d. per gal.; 95/160%, 1s. 7d.; 90%, 1s. to 1s. 2d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. GLASGOW: Crude, 5½d. to 6d. per gal.; 90% 160, 1s. 4½d. to 1s. 5½d.; 90% 190, 1s. to 1s. 1d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £12 to £13 per ton; purified crystals, £20 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 to £5 10s. per ton; crystals, £27 to £27 10s. GLASGOW: Fire lighter, crude, £7 to £7 10s. per ton (bags free).

PYRIDINE.—90/140%, 7s. 6d. to 9s. per gal.; 90/180, 2s. 3d. GLASGOW: 90% 140, 7s. to 8s. per gal.; 90% 160, 5s. to 6s.; 90% 180, 2s. 6d.

TOLUOL.—90%, 2s. per gal.; pure, 2s. 4d. GLASGOW: 90%, 120, 1s. 10d. to 1s. 11d. per gal.

PITCH.—Medium, soft, 35s. per ton, in bulk at makers' works. MANCHESTER: 32s. 6d. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 30s. to 35s. per ton; in bulk for home trade, 32s. 6d.

XYLOL.—Commercial, 2s. 1d. per gal.; pure, 2s. 3d. GLASGOW: Commercial, 1s. 11d. to 2s. per gal.

Latest Oil Prices

LONDON, Nov. 25.—LINSEED OIL was firm. Spot, £27 5s. per ton (small quantities); Dec., £24 17s. 6d.; Jan.-April £24 15s.; May-Aug. and Sept.-Dec., £25, naked. SOYA BEAN OIL was steady. Oriental (bulk), ex tank, spot, Rotterdam, £26 per ton. RAPE OIL was steady. Crude, extracted, £33 10s. per ton; technical refined, £34 10s., naked, ex wharf. COTTON OIL was firm. Egyptian crude, £27 10s. per ton; refined common edible, £30 15s.; deodorised, £32 15s., naked, ex mill small lots, £1 10s. extra). TURPENTINE was dearer. American, spot, 41s. 3d. per cwt.

HULL.—LINSEED OIL.—Spot, quoted £25 12s. 6d. per ton; Nov., £25 2s. 6d.; Dec., £25; Jan. to Dec., 1937, £24 15s. COTTON OIL.—Egyptian, crude, spot, £27 10s. per ton; edible, refined, spot, £30; technical, spot, £30; deodorised, £32, naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £29 per ton, naked. GROUNDNUT OIL.—Extracted, spot, £34 per ton; deodorised, £37. RAPE OIL.—Extracted, spot, £33 per ton; refined, £34. SOYA OIL.—Extracted, spot, £28 10s. per ton; deodorised, £31 10s. COD OIL, f.o.r. or f.a.s., 25s. per cwt. in barrels. CASTOR OIL.—Pharmaceutical, 43s. 6d. per cwt.; first, 38s. 6d.; second, 36s. 6d. TURPENTINE.—American, spot, 42s. 6d. per cwt.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., patent and trade mark agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Latisan. 568,010. Chemical substances used for agricultural, horticultural, veterinary, and sanitary purposes. Bayer Products, Limited, 31 to 34 Basinghall Street, London, E.C.2. April 9, 1936.

Tiona. 566,377. Titanium oxide and titanium pigments. National Titanium Pigments Ltd., Kingsway, Luton. February 11, 1936. (By consent.)

Kramsol. 567,003. Chemical substances used for agricultural, horticultural, veterinary, and sanitary purposes. Boots Pure Drug Co., Ltd., 37 Station Street, Nottingham. March 4, 1936.

Luminazo. 560,512. Azo dyestuffs intermediates being chemical substances for use in manufactures. British Dyestuffs Corporation, Ltd., Imperial Chemical House, Millbank, London, S.W.1. May 28, 1935.

Creo-Tint. 567,191. Chemical substances used in manufacture, photography, or philosophical research, and anti-corrosives. Fraser Colour Products, Ltd., 62 and 63 Cheapside, London, E.C.2. March 10, 1936.

Redmanol. 566,167. Chemical substances used in manufactures, photography, and philosophical research, and anti-corrosives. Bakelite, Ltd., 68 Victoria Street, London, S.W.1. February 3, 1936.

Oralix. 567,281. Sulphonated alcohols being chemical substances for use in softening leather in the course of manufacture. The Hexoran Co., Ltd., The Hives, Mosley Road, Trafford Park, Manchester, 17. March 13, 1936.

Wilray. 568,888. Chemical substances used in manufactures, photography, or philosophical research and anti-corrosives. The Willesden Varnish Co., Ltd., 26 Hythe Road, Willesden, London, N.W.10. May 19, 1936.

Caltiox. 568,884. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. British Titan Products Co., Ltd., Portrack Road, Billingham-on-Tees, Co. Durham. May 18, 1936.

Formitan. 567,531. Synthetic tannin being a chemical substance for use in tanning and currying. Yorkshire Tar Distillers, Ltd., Quebec House, Quebec Street, Leeds, 1. March 24, 1936.

From Week to Week

NEW PLANT which can produce about 25,000 gal. of motor spirit from coal per year, has been installed at the works of the Cleethorpes Gas Co., and the first 2,000 gal. has been dispatched from the works.

NEGOTIATIONS HAVE BEEN COMPLETED for the re-opening of the old distillery by the Distillers Co., Ltd., at Alloa. The works were burned out in 1914 and have since been closed. About 200 men will receive employment.

THE DIRECTORS OF TURNER AND NEWALL, LTD., have decided to give an annual summer holiday with pay (equivalent to six full working days) to all their employees engaged in the United Kingdom. A contributory holiday scheme has been in operation for some time in the case of the employees in some of the factories.

INCREASED DEMANDS upon their London factory at Homerton have made it necessary for Lewis Berger and Sons, Ltd., to extend their manufacturing facilities by the erection of new buildings and plant. During the past year an improvement in home trade has been evident in paint, colours, varnish and cellulose finishing materials.

STRIKE NOTICES AFFECTING 100 MEN at the works of British Tar Products, Ltd., Cadishead, have been suspended following the intervention of the Ministry of Labour. The representative of the Ministry's Industrial Relations Department is presiding at a joint conference of representatives of the employers and workers in the hope of arriving at a settlement.

MEMBERS OF THE CHEMICAL ENGINEERING GROUP and the Bristol Section of the Society of Chemical Industry will visit the new fertiliser factory of National Fertilisers, Ltd., at Avonmouth, next Wednesday afternoon. In the evening a joint meeting will be held at the Bristol University, when Dr. L. B. Pfeil will read a paper on "Some Alloy Cast Irons of Interest to Chemical Engineering." The meeting will be followed by an informal dinner.

THE IMPORT DUTIES ADVISORY COMMITTEE has received applications for increases in the import duties on potassium permanganate and sulphite lye, being a by-product of sulphite boiling for the production of chemical wood pulp, and extracts thereof. Representations should be addressed in writing to the Secretary, Import Duties Advisory Committee, Shell-Mex House, Strand, London, W.C.2, not later than December 17.

FIVE MEN HAD NARROW ESCAPES from serious injury when a floor collapsed during demolition work on the site of the big fire at the premises of Boots, chemists, Blackpool. A coping-stone weighing nearly two hundredweight fell on to the floor of the second storey, on which the men were standing, and a large part of the floor collapsed. Three of the men were taken to hospital, but were allowed to go home after treatment.

GUESTS TRAVELLED from London and Manchester to attend the second annual dinner-dance of the Scottish section of the Oil and Colour Chemists' Association at St. Enoch's Hotel, Glasgow, last week. Sir David Allan Hay and Lady Hay were the guests of honour. Among others present were Professor and Mrs. Cumming; Mr. and, Mrs. Kinsman, Manchester; Mr. Gosling, Manchester; Mr. Copping, London; and Dr. G. F. New, president of the Association.

IMPERIAL CHEMICAL INDUSTRIES, LTD., have decided not to continue to finance research work on molecular rays at the Laboratory of Physical Chemistry, Cambridge University, as Mr. R. G. J. Fraser has now joined the research staff of I.C.I. (Alkali), Ltd. In these circumstances, Sir Harry McGowan has written to the Vice-Chancellor, Mr. G. H. A. Wilson, offering the apparatus and equipment (originally costing about £2,500) as a gift to the Department of Chemistry and Physics.

A GIFT OF £10,000 from Imperial Chemical Industries, Ltd., to Glasgow University, as a contribution towards the cost of the new chemistry institute was intimated at a meeting of the University Court last week. When the announcement regarding the new building was made last May, it was stated that the approximate cost would be £200,000, to which the Carnegie Trustees for the Scottish Universities have made grants of £118,000. The institute will be situated in University Avenue.

THE DIRECTORS of Redfern's Rubber Works, Ltd., have inaugurated an assurance and pension scheme. Men over 21 years of age, and women over 30 years, employed by the firm will be eligible for the assurance part of the scheme under which employees obtain advantageous terms for endowment policies maturing at the estimated retirement age of 65 and drawable either in one payment or as an annuity. The company's contribution takes the form of an allocation of a fixed percentage of the total profits to a pensions fund in years when a basic minimum profit has been earned. Out of this fund pensions will be paid to employees who retire after lengthy and loyal service and, as the fund grows, it is hoped to take out paid-up policies for selected employees, which will mature at the age of 65. The fund starts with a balance of £1,247 reserved from the profits in 1935. Mr. W. E. Redfern, chairman, Councillor R. Breerton, sales manager of the mechanicals department and Mr. F. Warrilow, the company's accountant, have been appointed trustees of the scheme.

THE NOMINAL CAPITAL of Smeaton and Sons, Ltd., sanitary and chemical engineers, 15 Red Lion Street, W.C.1, has been increased by the addition of £4,000 in £1 ordinary shares beyond the registered capital of £1,000.

SEVEN MEN WERE KILLED and twenty men injured in an explosion at a chemical works belonging to the Monte Catini Company at Sinico, near Merano, Italy, on November 19. The works, which are connected with the manufacture of armaments, were inspected by Mussolini last year.

New Companies Registered

English Chemical Products, Ltd., 360 Grays Inn Road, W.C.—Registered November 12. Nominal capital £100. Producers and manufacturers of and dealers in chemicals, minerals, essential oils, food products, fruits and vegetable gums, etc. Subscribers: Isabella H. Campbell and Joachim H. Brat.

R. H. Stephens, Ltd.—Registered November 10. Nominal capital £500. Wholesale and retail dealers in hairdressers' requisites; chemists, druggists, etc. Subscribers: George W. Thomson, 50 Dufferin Avenue, Dublin; R. H. Stephens and F. P. Holtsbaum.

Hyde Chemical Works, Ltd.—Registered November 13. Nominal capital £1,000. Manufacturing and research chemists, etc. Directors: Alfred Geist, 8 Oakleigh Gardens, Edgware, and Abraham Kramer.

Fountain Products, Ltd.—Registered November 14. Nominal capital £2,500. Manufacturers of and dealers in chemicals, gases, drugs, medicines, toilet requisites and preparations, perfumes, etc. Subscribers: M. F. Barber, 27 Manor Park, Putney Hill, S.W.15, and Sydney Atkinson.

Anti-bi-San, Ltd.—Registered November 13. Nominal capital £55,000. To adopt an agreement with Southern Chemical Supplies, Ltd., for the acquisition of certain assets of that company, and to carry on business as manufacturers of and dealers in chemicals, gases, drugs, medicines, plaster of paris, gypsum, etc. Subscribers: Ernest T. Speller, 62 Paulet Road, Myatts Park, S.E.; and Alfred T. Pilling.

Savo Products, Ltd., Livsey Street, Rochdale.—Registered November 13. Nominal capital £1,000. Manufacturers, importers and exporters of and dealers in fireproofing solutions and fire-resistant preparations, fireproofing engineers and consultants, analytical chemists, manufacturing chemists, etc. Directors: Geo. R. Thompson, Fdk. Lord, Harry Williamson, and Harry H. Avican.

Etna Chemical Co., Ltd., 53/4 Haymarket, S.W.1. Registered November 23. Nominal capital, £100. Manufacturers, buyers and sellers of pharmaceutical, cosmetic and kindred products, etc. Directors: Arthur Ruben and W. Bretter.

Books Received

The Scientific and Technical Factors of Production of Gold and Silverwork. Course of lectures held at Goldsmiths' Hall under the auspices of the Worshipful Company of Goldsmiths. London: Goldsmiths' Company. Pp. 89. 1s.

Printing Metals. London: Fry's Metal Foundries, Ltd. Pp. 92.

Elements of Chemical Engineering. By Walter L. Badger and Warren L. McCabe. Second edition. London: McGraw-Hill Book Co. Inc. Pp. 660. 30s.

The World of Science. By Dr. F. Sherwood Taylor. London: William Heinemann, Ltd. Pp. 1063. 8s. 6d.

Aluminium Paint and Powder. By Junius D. Edwards. New York: Reinhold Publishing Corporation. London: Chapman and Hall, Ltd. Pp. 216. 22s. 6d.

Everyday Science. By A. W. Haslett. London: G. Bell and Sons, Ltd. Pp. 354. 7s. 6d.

The New Chemisrty. By E. N. daC. Andrade. London: G. Bell and Sons, Ltd. Pp. 58. 3s. 6d.

Prelude to Chemistry: an Outline of Alchemy, its Literature and Relationships. By John Read. London: G. Bell and Sons. Pp. 328. 12s. 6d.

The Preservation of Iron and Steel by Means of Paint. By L. A. Jordan and L. Whitby. Sixteenth Bulletin of the Research Association of British Paint, Colour and Varnish Manufacturers. Paint Research Station, Waldegrave Road, Teddington, Middlesex. Pp. 68. 2s. 6d.

The Aromatic Diazo-Compounds and their Technical Applications. By K. H. Saunders. London: Edward Arnold and Co. Pp. 224. 12s. 6d.

Catalytic Reactions at High Pressures and Temperatures. By Vladimir N. Ipatieff. New York: The Macmillan Company. Pp. 786. 30s.

Company News

A. Boake Roberts.—A final dividend of 1 per cent net (1½ per cent.) has been announced.

William Briggs and Sons.—A final dividend at the rate of 10 per cent. per annum for first period from November 14, 1935, to November 30, 1936 (company registered in 1935), has been announced.

Power Gas Corporation.—The dividend for the year ended September 30 last has been raised from 5 per cent. to 6 per cent., less tax. The company has an issued and authorised capital of £300,000 in £1 shares.

Wiggins, Teape and Co.—An advance in net profits of £6,875, to £277,972, is estimated in a progress report covering three quarters of the year which ended on September 30 last. The figure for the corresponding period last year was £271,097.

British Industrial Plastics.—The accounts for the year to September 30, 1936, show gross profit £80,485 (£74,227), or a net profit £27,457 (£26,674), after providing £10,933 for depreciation, obsolescence and tax. The dividend is 8 per cent., less tax (same), and the forward £2,807 (£2,797).

Solidol Chemical.—The accounts for year ended December 31, 1935, show that the net loss, after charging management, administration and distribution expenses and directors' fees, amounts to £4,966 (£5,429, including special legal expenses); add debit of £19,951 brought in, making total debit of £24,917 forward.

Sulphide Corporation.—A dividend of 10 per cent. has been declared on the preference and 5 per cent. on the ordinary shares, both subject to tax, to be paid out of the profits earned for the year ended June 30 last. The previous year the preference received 10 per cent. and the ordinary 2½ per cent.

Viking Whaling.—Profits jumped from £32,226 to £87,949 in the year to July 31 last. The ordinary distribution is raised by 5 per cent., to 15 per cent. General reserve receives £25,000, against nil, and £3,000 is transferred to a pension fund for the benefit of whaling crews. The carry forward is up from £37,563 to £50,890.

Clover Paint and Composition.—An interim dividend of 2½ per cent., less tax (first and final of 5 per cent.), on account of year ending April 30, 1937, has been announced. A dividend on 7½ per cent. cumulative participating preference shares for half year ending October 31 has also been declared. Both dividends will be paid on December 1.

Splintex Safety Glass.—Profit to June 30, after cost of manufacture and expenses of administration, was £1,093 (against £866). Debit forward £46,731 (£47,621). Plant, machinery and equipment in use have been fully maintained out of revenue, and, as in previous years, depreciation has been provided on that portion of plant and machinery only. The directors have acquired the right to manufacture laminated safety glass under a process not hitherto in use in this country. The necessary alterations to factory and equipment have now been completed and will enable new glass to be offered for sale very shortly.

South African Torbanite Mining and Refining Co.—The report for the year to June 30, states that the company's petrol has met with a satisfactory reception from the public. The directors anticipate that the plant will reach its full capacity early in 1937. From June 10, 1936, the retorts have operated fairly continuously, but it is not anticipated that a regular supply of torbanite crude oil will be produced until early in 1937. Approximately 290,000 gallons of crude oil from torbanite have been produced to date. As the company was operating under abnormal conditions and a regular production stage was not reached, no profit and loss account is submitted.

Unilever.—The boards of Unilever, Ltd., and Unilever N.V., have declared interim dividends on their respective ordinary capitals, payable on December 1. The Dutch company has raised its half-yearly distribution from fl.20 to fl.25 per fl.1,000 share, or 2½ per cent., an increase of ½ per cent. In the absence of any fixed ratio between sterling and the guilder the English company has again followed the practice instituted when sterling went off gold, so that the equivalent dividend on each £1 of stock is the sterling value of 30 Dutch cents. Converted at the rate of exchange on the day of declaration, this is equal to 8d. per £1 of stock, or 3⅓ per cent., which is unchanged from the previous year.

Tate and Lyle.—A final dividend of 14 per cent. on the ordinary shares, making a total distribution of 18¼ per cent., less tax, for the year to end-September, is announced. In the previous twelve months the final payment of 14 per cent. was preceded by an interim of 6 per cent., and capital bonus of 40 per cent. The total payment for the year of 20 per cent. was equivalent to 18.2857 per cent. on the increased capital. It is proposed to place £284,000 to reserve, compared with £310,000 last year, and to transfer £316,000 from investment reserve to general reserve. The balance to be carried forward is raised from £56,234 to £58,874.

B. Laporte.—An interim of 5 per cent., less tax (same), has been declared on ordinary shares, payable December 1.

British Tar Products.—Payment is announced of 3¾ per cent., and a bonus of 5 per cent., less tax, on ordinary shares, making 10 per cent., and bonus 5 per cent. for year, payable December 17.

Chilean Nitrate and Iodine Sales Corporation.—Glyn, Mills and Co., trustees under the trust deed securing the issue of 5 per cent. sterling income debentures of the Chilean Nitrate and Iodine Sales Corporation, announce that an interest payment will be made on December 31, 1936, at the full rate of 2½ per cent. The debentures received the full 5 per cent. for the year to June 30 last.

Lancegaye Safety Glass (1934).—The directors have declared an interim dividend of 7 per cent., less tax, in respect of the year ending March 31 next, payable on December 7. Last year the total distribution was 6 per cent., less tax, being made up of an interim of 2½ per cent. and a final of 3½ per cent., which were paid on the amount of capital issued as at the dates of declaration. Of the £120,000 authorised capital, £113,244 5s. is now issued and paid up in 1s. shares.

Whitehead Iron and Steel, Ltd.—Profits of £132,000 (subject to audit) for the half year to September 30 last have been announced. This figure is struck after providing for all charges and setting aside £10,000 for depreciation and £22,500 for tax. For the corresponding period of 1935 the profits were £114,123, when £10,000 was allowed for depreciation and £16,000 for tax. In the full year to March 31 last, profits, after depreciation and tax, etc., were £250,564. The interim dividend is maintained at 12½ per cent., less tax. Last year's interim was followed by a final dividend of 12½ per cent., accompanied by a 10 per cent. cash bonus.

United Molasses Co.—A preliminary statement shows a substantial advance in the consolidated profits of the company and its subsidiaries for the year ended September 30 last. After providing for directors' fees, management expenses and all other charges, the figure is £789,044, which compares with £718,200 in the previous year. The directors recommend a final dividend of 10 per cent., less tax, on the ordinary shares (being 8d. per share gross), making a total payment for the year of 14 per cent., against 8 per cent., less tax. The issued and paid capital of the company is £3,190,500, divided into £1,250,000 6 per cent. cumulative preference stock, and £1,940,500 ordinary stock in units of 6s. 8d.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

Satisfactions

CLARK, NETTLESHIP AND BAILEY, LTD., Leicester, manufacturers of medicines, etc. (M.S. 28/11/36.) Satisfaction, November 13, of mortgage registered June 5, 1936, to extent of £6,000.

STEWARTS AND LLOYDS, LTD (incorporated in Scotland). (M.S., 28/11/36.) Satisfaction, November 17, of debenture stock registered February 8, 1934, to extent of £12,700.

County Court Judgments

(NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court Judgments against him.)

RILEY, EDWIN, 104 Wigmore Street, W., manufacturing chemist. (C.C., 28/11/36.) £19 6s. 4d. October 21.

SUTTON, FRANCIS COLIN, and SUTTON, MABEL MATILDA (wife), 76 Greenfield Gardens, Cricklewood, consulting chemical engineer. (C.C., 28/11/36.) £55 1s. 3d. October 26.

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